UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to:
2002/00111

April 22, 2004

Mr. Bob Graham
State Conservationist
Natural Resources Conservation Service
101 SW Main St., Suite 1300
Portland, OR 97204

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery and Conservation Management Act Essential Fish Habitat Consultation on Resource Management Systems for Dry Cropland and Range and Pastureland in Gilliam, Sherman and Wasco Counties, Oregon

Dear Mr. Graham:

Enclosed is a biological opinion (Opinion) pursuant to section 7 of the Endangered Species Act (ESA) prepared by NOAA's National Marine Fisheries Service (NOAA Fisheries), on the effects of authorizing, funding and carrying out the proposed Resource Management Systems for Dry Cropland and Range and Pastureland in Gilliam, Sherman and Wasco Counties, Oregon. In this Opinion, NOAA Fisheries concludes that the proposed action is not likely to adversely affect the following ESA-listed species or designated critical habitats when applied to fields and pastures in upland areas, nor is the proposed action likely to jeopardize those species or destroy or adversely modify designated critical habitats when applied alongside certain wetlands and streams within the geographic range occupied by these species.

Species considered in this Opinion are Snake River (SR) spring/summer chinook salmon (*Oncorhynchus tshawytscha*), Snake River (SR) fall chinook salmon, Upper Columbia River (UCR) spring-run chinook salmon, Lower Columbia River (LCR) chinook salmon, Upper Willamette River (UWR) chinook salmon, Columbia River (CR) chum salmon (*O. keta*), Snake River (SR) sockeye salmon (*O. nerka*), Snake River (SR) steelhead (*O. mykiss*), Upper Columbia River (UCR) steelhead, Middle Columbia River (MCR) steelhead, Lower Columbia River (LCR) steelhead, and Upper Willamette River (UWR) steelhead,

As required by section 7 of the ESA, NOAA Fisheries includes reasonable and prudent measures with nondiscretionary terms and conditions that NOAA Fisheries believes are necessary to minimize the potential for incidental take associated with this action. The NRCS and others cooperating to accomplish the proposed action must comply with these terms and conditions for the exemption from the prohibition against taking in section 7(o) to apply.

This document also serves as consultation on essential fish habitats (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and includes conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects to EFH. Section 305(b)(4)(B) of the MSA requires Federal agencies to provide a detailed written response to NOAA Fisheries within 30-days after receiving these recommendations. If the response is inconsistent with the recommendations, the action agency must explain why the recommendations will not be followed, including the justification for any disagreements over the effects of the action and the recommendations.

Please direct any comments you may have regarding this document to Marc Liverman 503.231.2336, or draft to Dan Tonnes 503.736.4743 of my staff in the Oregon State Habitat Office.

Sincerely,

for Michael R Crouse

D. Robert Lohn
Regional Administrator

cc: Marie Morin, USFWS

Endangered Species Act - Section 7 Consultation
Biological Opinion

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Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Resource Management Systems for
Dry Cropland and Range and Pastureland in
Gilliam, Sherman and Wasco Counties, Oregon

Agency:	Natural Resources Conservation Service
Consultation Conducted By:	National Marine Fisheries Service, Northwest Region
Date Issued:	April 22, 2004
Issued by:	for Michael R Crouse ________________ D. Robert Lohn Regional Administrator
Refer to:	**2002/00111**

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1. INTRODUCTION

1.1 Background

The Natural Resources Conservation Service (NRCS), in cooperation with local Soil and Water Conservation Districts (SWCDs) and individual farm and ranch operators, proposes to develop Resource Management Systems (RMS) that will guide the completion of individual farm and ranch conservation plans for Dry Cropland and Range and Pastureland agriculture in Gilliam, Sherman, and Wasco Counties (Tri-County Region), Oregon.[1] Further, the NRCS proposes to assume program responsibility for each conservation plan by providing engineering designs or other final project specifications and/or pay for all or part of the conservation practices (CPs) necessary to carry out each plan. The purpose of the proposed action is to achieve sustainable natural resource use by preventing or alleviating resource degradation pursuant to Title 2 of the Farm Security and Rural Investment Act of 2002. This consultation does not cover RMS planning related to irrigated cropland, fruit production, hay production, wildlife lands, or other types of agricultural systems that may occur in the Tri-County Region.

The RMS plans consist of a combination of CPs and resource management actions, identified by land or water uses, for the treatment of all resource concerns for soil, water, air, plants and animals that meets or exceeds the quality criteria in the Field Office Technical Guide for resource sustainability (NRCS 2003). Treatment levels necessary for an RMS to adequately address natural resource concerns identified during the planning process, including habitat needs of threatened and endangered species, are set by RMS quality criteria and human considerations described in Title 450, Part 401, Subpart C of the NRCS Online Directives Management System. Human considerations are to be used as a checklist during this process to ensure consideration of the human dimension when formulating and evaluating an RMS. In cases where actions by individual cooperators cannot solve an existing conservation problem in accordance with RMS criteria, group planning will be encouraged and the criteria are deemed to be met if the client is not contributing to the problem. Quality Criteria are defined as a quantitative or qualitative statement of treatment level required to achieve a RMS for identified resource concerns for a planning unit. Quality Criteria are established in accordance with local, state, tribal and Federal programs and regulations in consideration of ecological, economic and social effects (NRCS 2003).

Before this consultation, Quality Criteria applied within the Tri-County Region did not explicitly address aquatic species listed under the Endangered Species Act (ESA). As part of the consultation process, NOAA Fisheries, the NRCS, and the cooperators agreed to characteristics

[1] For purposes of this Opinion, the SWCDs and individual farm and ranch operators working with the NRCS to accomplish actions described here will be considered 'cooperators' who require formal approval or authorization from the action agency as a prerequisite to conducting those actions (see, 50 CFR 402.02). As such, the cooperators are entitled to the exemption from the prohibition against take of ESA-listed salmon and steelhead described in section 7(o)(2) of the Endangered Species Act, provided that the taking is in compliance with all of the terms and conditions described in the incidental take statement attached to this Opinion.

of salmon quality criteria and indicators for riparian and aquatic habitats that would be applicable within the action area. The salmon quality criteria and indicators, and their use in the RMS planning process to design, evaluate, install, and operate conservation practices that make up each farm and ranch conservation plan, are the subjects of this consultation.

1.2 Consultation History

In 2000, the National Marine Fisheries Service (NOAA Fisheries), the Oregon State office of the NRCS, the Tri-County SWCDs, the Oregon Department of Agriculture (ODA), the U.S. Fish and Wildlife Service (USFWS), the Oregon Department of Fish and Wildlife (ODFW), the Oregon State University Extension Service (OSU Extension), local farm and ranch operators, and other interested parties began joint discussions about aquatic conservation goals in the Mid-Columbia region. In March 2001, the NOAA Fisheries received a letter from the NRCS requesting assistance in the development of a biological assessment for agricultural practices in the Tri-County Region, with an intent to enter into formal section 7 consultation on its completion.

In April 2001, NOAA Fisheries accepted the NRCS' invitation and entered into informal discussions with the NRCS and its conservation partners during the following year to refine the scope of the proposed action, based on an analysis of adverse effects to ESA-listed salmon and steelhead and their habitats, and the identification of appropriate mitigation measures. In May 2001, the NRCS notified NOAA Fisheries that it designated the Tri-County Region SWCDs as the NRCS designated Federal representative for the purposes of the consultation. In February 2002, the NRCS submitted a draft biological assessment (BA) describing an RMS for Dry Cropland and one for Range and Pastureland in the Tri-County Region. Following further discussions, the NRCS submitted a new draft biological assessment in June 2002.

NOAA Fisheries shared four working drafts of this biological opinion (Opinion) with the NRCS.[2] The NRCS, in turn, discussed each of these drafts extensively with members of the Tri-County SWCDs and other interested parties. This provided many opportunities to fully engage cooperators in the consultation, and ensured they had an adequate opportunity to identify, understand and work through complex and unprecedented consultation issues. NOAA Fisheries participated in some of those deliberations, primarily to explain the consultation process and standards, but generally stood by until the NRCS and the cooperators could agree on comments needed to begin work on each successive working draft. Although this iterative process extended the consultation to an unusual degree, it helped the NRCS to establish a strong, cooperative relationship with NOAA Fisheries while maintaining its traditional partnership with local agencies and producers.

[2] The draft opinions were dated January 23, April 15, August 13, 2003, and January 22, 2004.

1.3 Proposed Action

Over the next five years, the NRCS proposes to develop and complete RMS plans for a portion of the more than 468,000 acres of dry cropland and more than 1,107,000 acres of range and pastureland in the Tri-County Region (Table 1). The NRCS will help to carry out these plans with technical assistance from the local SWCDs and U.S. Department of Agriculture (USDA) farm program funding. In Oregon, completion of RMS-level planning is a requirement for participation in funding from various USDA farm programs (NRCS 2002). Part of the dry cropland and range and pastureland in this category are already operating under Progressive Plans, defined by the NRCS as a plan whereby the client is ready, willing and able to make and implement some, but not all, of the actions necessary to carry out an RMS level plan. The NRCS will review and upgrade these Progressive Plans to RMS Plans as needed (NRCS 2002). The purpose of the proposed actions is to formally link agricultural conservation practices with species conservation goals to achieve sustainable natural resource use pursuant to Title 2 of the Farm Security and Rural Investment Act of 2002.

Table 1. Dry Land Crops and Range Land Acres with Potential for RMS-Level Planning in Gilliam, Sherman and Wasco Counties, Oregon over a 10-year period (NRCS 2002).

County	Total Cropland	Cropland Identified for RMS	Total Rangeland	Rangeland for RMS	Total Crop and Rangeland	Total for RMS Planning
Gilliam	267,897	194,447	430,093	418,706	697,936	613,153
Sherman	302,200	144,000	141,700	96,700	443,700	240,700
Wasco	214,000	129,656	663,000	592,000	877,000	721,656
TOTALS	784,097	468,103	1,232,793	1,107,406	2,018,636	1,575,509

The planning process used by the NRCS to develop an individual RMS for private land consists of the following nine steps (NRCS 2002): (1) Identify problems and opportunities; (2) determine objectives; (3) inventory resources; (4) analyze resource data; (5) formulate alternatives; (6) evaluate alternatives; (7) make decisions; (8) implement the plan; and (9) evaluate the plan. RMS plans present farmers and ranchers with information about management options and their associated costs, but accomplishment of a full RMS plan is necessary to resolve all identified resource concerns (NRCS 2002). In this case, the RMS plan cost calculation will identify individual planning unit costs plus additional costs that may be associated with accomplishing any watershed-wide measures necessary to conserve ESA-listed salmon and steelhead.

Table 2. Salmon quality criteria and target/indicators for RMS planning (adapted from USDA and NRCS 1998).

Salmon Quality Criteria	Target/ Indicator
Channel Condition	Evidence of past channel alteration, but with significant recovery of channel and banks. Any dikes or levies are set back to provide access to an adequate floodplain – Score of 7 or higher
Hydrologic Alteration	Score of 7 or higher – Flooding occurs only once every 3 to 5 years; limited channel incision. Withdrawals, although present, do not affect available habitat for biota.
Riparian Zone	Score of 10 – Natural vegetation extends at least two active channel width on each side or, if less than two widths, covers entire floodplain whenever appropriate soils, slope and topography are present to support natural riparian vegetation.
Bank Stability	Score of 7 or higher – Moderately stable; banks are low (at elevation of active floodplain); more than 33% of eroding surface area of banks in outside bends is protected by roots that extend to the baseflow elevation.
Nutrient Enrichment	Score of 7 or higher – Clear water along entire reach; diverse aquatic plant community includes low quantities of many species of macrophytes; little algal growth present.
Barriers to Fish Movement	Score of 10 – No barriers to upstream or downstream movements of juvenile or adult life stages, seasonal water withdrawals do not inhibit movement within the reach.
Instream Cover	Score of 8 or higher – 6 to 7 cover types available.
Pools	Score of 7 or higher – Pools present, but not necessarily abundant; from 10 to 30% of the pool bottom is obscure due to depth, or the pools are at least 3-feet deep.
Invertebrate Habitat	Score of 7 or higher – 3 to 4 types of habitat. Potential habitat exists, such as overhanging trees, that will provide habitat, but have not yet entered the stream.
Canopy Cover	Score of 7 or higher – >50% shaded in reach or >75% in reach, but upstream 2 to 3 miles poorly shaded.
Riffle Embeddedness	Score of 10 – Gravel or cobble particles are <20% embedded.
Macroinvertebrates	Score of 10 or higher –Community dominated by Group I (refer to the SVAP) or intolerant species with good species diversity. Examples include caddisflies, may-flies, stoneflies and hellgrammites.

Application of Salmon Quality Criteria
The NRCS proposes to apply the salmon quality criteria (Table 2) during RMS planning to evaluate aquatic habitats, then identify actions that will improve or maintain those conditions as necessary to meet the conservation needs of ESA-listed salmon and steelhead. Use of these criteria will also serve as an important cross-check on the potential adverse effects of management actions under the cooperators' control that can prevent or delay the recovery of desired aquatic habitat conditions so those actions will be modified or excluded as necessary. The salmon quality criteria are based on assessment elements used in the NRCS Stream Visual Assessment Protocol (SVAP) (USDA NRCS 1998), and range from physical habitat conditions to biotic indicators. The target/indicators for these criteria are expressed as minimum scores that are also described in the SVAP. While these criteria and indicators are observed as essentially static characteristics, they are intended to represent the health of underlying processes and, taken together, are intended to represent the full suite of minimum habitat functions necessary to conserve the ESA-listed salmon and steelhead analyzed in this Opinion. As stated earlier, Quality Criteria are established in accordance with local, state, tribal and Federal programs and regulations, so analysis of these criteria in this Opinion does not supersede the need to meet state, tribal, or Federal water quality standards.

1.3.1 Dry Cropland RMS

Typical RMS plans for the production of non-irrigated crops in the Tri-County Region include a combination of 25 CPs. The practices are listed and described in the BA. The typical Dry Cropland RMS plans involves growing small grains (*i.e.*, soft white wheat, feed barley), usually every other year on a given piece of land. The majority of the small grain grown is fall or winter wheat planted from September to November in soil that has been fallowed the previous growing season. Undesirable vegetation that grows into the fallowed crop land is controlled with mechanical tillage.

Mechanically Tilled Fallow (CP329b) begins after harvest of the wheat crop in July or August. The crop residue of stubble and chaff may be harrowed, mowed, sprayed, grazed or simply left standing. This crop residue is typically held over winter from September through March with no further activities.

As the soil warms in March and the surface dries, mechanical tillage (such as chisel) begins. Depending on the amount of undesirable vegetation, rainfall, and soil condition, typically two to four tillage operations will be conducted. Fertilizers for the next fall wheat crop may be applied with a shank injector (CP590) during June or from September to October before seeding.

The fall wheat crop is seeded (CP328, CP330) from September through November into the prepared summer fallow seed bed using a grain drill with disc or hoe openers. This crop usually emerges in two to three weeks. It grows until winter temperatures and soil conditions cause it to go dormant for the winter, then begins growing again in the early spring. Yield potential depends on soil moisture, rainfall, fertility, weed competition, disease levels, temperature and other growing conditions. Fall wheat is usually harvested using combines in July or August.

The cycle begins again and repeats itself. However, very seldom will two years' activities be exactly the same.

Modifications to this typical system include the use of Residue Management - No-Till (CP329A) or Residue Management Direct Seed (CP777). In this system, mechanical tillage is reduced and used only during the seeding and fertilizing process. The crop is seeded and fertilized in one pass into the previous crop's residue. Other modifications to the typical system occur when Conservation Crop Rotation (CP328) is shifted to a spring grain or replanted fall grain. In these systems, spring barley or wheat or another spring crop is seeded in March or April into the previous fall grain residue and harvested in July or August, or October through November, if field was replanted for fall grain.

Supporting long-term CPs such as Diversions (CP362), Terraces (CP600) or Water and Sediment Control Basins (CP638) are constructed as needed in the fields during the fallow period, typically from April to July, and/or after harvest, and then again after harvest, from September to December. The long-term practices are constructed once, then maintained for their 10 to 20 year life span. Other CPs, including Contour Buffer Strips, Conservation Cover, and Filter Strips or Grassed Waterways (CP393, 327, 393, 412, respectively), are established on soils or surfaces that are shallow, non-productive or highly erodible. This is usually done in October or April depending on the vegetation species to be seeded and rainfall zone. Contour Strip Cropping (CP585) is installed during the fallow period either after September harvest to November, or in the spring from April to June. Deep Tillage (CP324) is used infrequently in late summer after harvest to break up restrictive layers. Upland Wildlife Habitat Enhancement practices (CP645, 648), including watering facilities, may be installed throughout the year.

1.3.2 Range and Pastureland RMS

A typical RMS plan on rangeland and pastureland in the Tri–County Region consists of prescribed grazing management that incorporates a deferred or rest-rotation type of animal movement to make optimal use of available forage. Prescribed grazing manages animal movements to control the timing, intensity, frequency, and duration of grazing to meet management objectives. The default amount of forage allocated (harvest efficiency) is 25% on rangeland, 30 to 35% on pastureland, and 10 to 15% on Dry Cropland aftermath. These figures represent the average percentage of the weight of annual growth available during the grazing period. The other practices associated with the RMS plans are either *facilitating* practices that enable the prescribed grazing to work effectively, or *accelerating* practices that result in increased amounts of forage and roughage available for harvest. After a complete inventory of existing resources is completed using the RMS planning process, a preliminary stocking rate in animal unit months per acre (AUMs/acre) is developed to meet the objectives of the producer while maintaining or improving the natural resource conditions identified in the survey. The RMS plans for Range and Pastureland are designed to meet the animals needs for food, water, security and cover (NRCS 2002), and includes approximately 20 CPs.

The NRCS also proposed to use Technical Reference 1734-6 2000, *Interpreting Indicators of Rangeland Health* (version 3- NRCS, USGS, BLM 2000) to evaluate prescribed grazing systems. This document does not prescribe rangeland management. Rather, it is a tool to describe non-riparian rangeland indicators, such as water flow patterns, bare ground, gullies, litter movement, and susceptibility of a soil surface to erosion. Although this guidance is not directly applicable to riparian or aquatic conditions, descriptions of baseline rangeland conditions and the design of grazing RMS is improved with its use.

Native or established vegetation on rangelands provides livestock food needs, except in winter when snow covers available forage and supplemental feeds may be necessary. The sustainability of the forage is increased by managing the timing and movement of livestock to provide vegetation at least one undisturbed growing season in every three or four years (CP528A). In some degraded areas or abandoned cropland, permanent vegetation is planted to augment native forages (CP550) or enhance native forage production. Controlling or removing undesirable and unsuitable amounts of brush to improve forage stands and ecological condition (CP314), protecting what is there from fire (CP394) and providing protection from concentrated flow erosion (CP402) are other measures commonly employed on range and pasture lands.

Distribution of grazing across the landscape to prevent livestock from overusing stream courses and to decrease plant damage is encouraged through strategic water development and distribution. Ponds (CP378) can be built to catch and hold surface runoff, wells (CP642) may be drilled with pipelines (CP516) taking water to drinking troughs (CP614) or springs may be developed (CP574) with pipeline and troughs to achieve more even grazing distribution. In addition, leaving strategic patches of brush or installing fences can facilitate shelter and cover needs of range animals.

Many practices can have multiple purposes within Range and Pastureland RMS plans. Fencing assists in better distribution of livestock for more even use of forages, while excluding livestock (CP472) from sensitive areas such as riparian zones, newly seeded acres, or program restricted areas facilitates vegetation growth and recovery. Animal Trails and Walkways (CP575) can provide easier access to watering areas, livestock movement for rotation purposes, access to areas not normally used, or access across sensitive areas.

Riparian areas are managed to meet desired ecological objectives. Often a use exclusion is necessary to allow the natural recovery of areas degraded by overgrazing. Off-stream water development practices are often used, and timely livestock movement when indicated are methods to minimize adverse effects of livestock grazing on riparian areas.

Consideration for existing wildlife in forage allocations is a critical component of the inventory and final RMS plan. Seeding mixtures for range planting include species compatible with wildlife habitat needs (CP645), and watering facilities are designed to meet wildlife as well as livestock needs, or are sometimes constructed as separate facilities. Travel corridors, nesting seasons, thermal and escape cover, and fisheries issues are factored into the prescribed grazing and support practices. The prescribed gazing system is usually evaluated annually. The underlying goal is to achieve a balance between ecosystem needs, annual forage supply, and livestock production goals.

2. ENDANGERED SPECIES ACT

The ESA (16 USC 1531-1544), amended in 1988, establishes a national program for the conservation of threatened and endangered species of fish, wildlife, and plants and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with U.S. Fish and Wildlife Service and NOAA Fisheries, as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or to adversely modify or destroy their designated critical habitats. This Opinion is the product of an interagency consultation pursuant to section 7(a)(2) of the ESA and implementing regulations found at 50 Part 402.

2.1 Biological Opinion

The objective of this consultation is to determine whether the proposed RMS plans within the Tri-County Region, Oregon are likely to jeopardize the continued existence of the following 12 listed ESUs[3] of Columbia Basin salmonids, or cause the destruction or adverse modification of their designated critical habitats:

1. Snake River (SR) spring/summer chinook salmon (*Oncorhynchus tshawytscha*)
2. Snake River (SR) fall chinook salmon
3. Upper Columbia River (UCR) spring-run chinook salmon
4. Lower Columbia River (LCR) chinook salmon
5. Upper Willamette River (UWR) chinook salmon
6. Columbia River (CR) chum salmon (*O. keta*)
7. Snake River (SR) sockeye salmon (*O. nerka*)
8. Snake River (SR) steelhead (*O. mykiss*)
9. Upper Columbia River (UCR) steelhead
10. Middle Columbia River (MCR) steelhead
11. Lower Columbia River (LCR) steelhead
12. Upper Willamette River (UWR) steelhead

2.1.1 Biological Information and Critical Habitat

The listing status and history for species addressed in this Opinion are summarized in Table 3. Designated critical habitats for Snake River fall chinook, spring/summer chinook and sockeye

[3] 'ESU' means a population or group of populations that is considered distinct (and hence a 'species') for purposes of conservation under the ESA. To qualify as an ESU, a population must (1) be reproductively isolated from other conspecific populations, and (2) represent an important component in the evolutionary legacy of the biological species (Waples 1991a).

occurs within the proposed action area. Essential elements of the critical habitat for salmonids are: (1) Substrate; (2) water quality; (3) water quantity; (4) water temperature; (5) water velocity; (6) cover/shelter; (7) food (juvenile only); (8) riparian vegetation; (9) space; and (10) safe passage conditions (50 CFR 226). Based on migratory and other life history timing, it is likely that adult and juvenile life stages of these 12 ESA-listed salmon and steelhead would be present downstream of the Tri-County Region in the Columbia River mainstem, estuary, and plume when activities authorized by the proposed actions would be carried out. The MCR steelhead, in particular, migrates, spawns and rears throughout the Tri-County Region including the lower John Day River and lower Deschutes River. Actions authorized by the proposed RMS Plans may affect all of these essential habitat features, although the effects of each individual action will vary in timing, duration, and intensity.

2.1.2 Evaluating the Proposed Action

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR 402 (the consultation regulations). NOAA Fisheries must determine whether the action is likely to jeopardize ESA-listed species and/or whether the action is likely to destroy or adversely modify designated critical habitat. This analysis involves the initial steps of: (1) Defining the biological requirements of the ESA-listed species; and (2) evaluating the relevance of the environmental baseline to the species' status.

Subsequently, NOAA Fisheries evaluates whether the action is likely to jeopardize the ESA-listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NOAA Fisheries must consider the estimated level of mortality attributable to: (1) Collective effects of the proposed or continuing action; (2) the environmental baseline; and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to life stages of the ESA-listed salmon and steelhead that occur beyond the action area. If NOAA Fisheries finds that the action is likely to jeopardize, NOAA Fisheries must identify reasonable and prudent alternatives for the action.

NOAA Fisheries also evaluates whether the action, directly or indirectly, is likely to destroy or adversely modify designated critical habitat. NOAA Fisheries must determine whether habitat modifications appreciably diminish the value of critical habitat for both survival and recovery of the ESA-listed species. NOAA Fisheries identifies those effects of the action that impair the function of any essential feature of critical habitat. NOAA Fisheries then considers whether such impairment appreciably diminishes the habitat's value for the species' survival and recovery. If NOAA Fisheries concludes that the action will adversely modify critical habitat, it must identify any reasonable and prudent alternatives available.

Table 3. References for additional background on listing status, critical habitat, protective regulations, and biological information for the ESA-listed salmon and steelhead addressed in this Opinion.

Species	**Listing Status**	**Critical habitat**	**Protective Regulations**	**Biological Information, Population Trends**
Snake River spring/summer chinook salmon	April 22, 1992, 57 FR 14653 Threatened	December 28, 1993, 58 FR 68543 and October 25, 1999, 64 FR 57399	April 22, 1992 57 FR 14653	Matthews and Waples 1991; Healey 1991; ODFW and WDFW 1998
Snake River fall-run chinook salmon	April 22, 1992, 57 FR 14653 Threatened	December 28, 1993, 58 FR 68543	July 22, 1992 57 FR 14653	Waples *et al.* 1991b; Healey 1991; ODFW and WDFW 1998
Upper Columbia River spring run chinook salmon	March 24, 1999, 64 FR 14308 Endangered		ESA prohibition on take applies	Myers *et al.*1998; Healey 1991; ODFW and WDFW 1998; WDFW 1993
Lower Columbia River chinook salmon	March 24, 1999, 64 FR 14308 Threatened		July 10, 2000 65 FR 42422	Myers *et al.*1998; Healey 1991; ODFW and WDFW 1998; WDFW 1993
Upper Willamette River chinook salmon	March 24, 1999, 64 FR 14308 Threatened		July 10, 2000 65 FR 42422	Myers *et al.*1998; Healey 1991; ODFW and WDFW 1998
Columbia River chum salmon	March 25, 1999, 64 FR 14508 Threatened		July 10, 2000 65 FR 42422	Johnson *et al.*1997; Salo 1991; ODFW and WDFW 1998; WDFW 1993
Snake River sockeye salmon	November 20, 1991, 56 FR 58619 Endangered	December 28, 1993, 58 FR 68543	ESA prohibition on take applies	Waples *et al.* 1991a; Burgner 1991; ODFW and WDFW 1998
Snake River Basin steelhead	August 18, 1997, 62 FR 43937 Threatened		July 10, 2000 65 FR 42422	Busby *et al.* 1995; Busby *et al.* 1996; ODFW and WDFW 1998
Upper Columbia River steelhead	August 18, 1997, 62 FR 43937 Endangered		ESA prohibition on take applies	Busby *et al.* 1995; Busby *et al.* 1996; ODFW and WDFW 1998; WDFW 1993
Middle Columbia River steelhead	March 25, 1999, 64 FR 14517 Threatened		July 10, 2000 65 FR 42422	Busby *et al.* 1995; Busby *et al.* 1996; ODFW and WDFW 1998; WDFW 1993
Lower Columbia River steelhead	March 19, 1998, 63 FR 13347 Threatened		July 10, 2000 65 FR 42422	Busby *et al.* 1995; Busby *et al.* 1996; ODFW and WDFW 1998
Upper Willamette River steelhead	March 25, 1999, 64 FR 14517 Threatened		July 10, 2000 65 FR 42422	Busby *et al.* 1995; Busby *et al.* 1996; ODFW and WDFW 1998

2.1.2.1 Biological Requirements

The first step in the ESA analysis of a proposed or on-going action is to define the biological requirements and status of the species. For Pacific salmonids, NOAA Fisheries evaluates species level biological requirements at the ESU level and at the action area level. These requirements may be described in a number of different ways, including population viability variables and habitat conditions necessary to ensure continued survival and recovery of the species (NMFS 1999).

<u>Population Viability</u>
Since 1995, NOAA Fisheries has used the viable salmonid population (VSP) concept as a tool to evaluate whether the species level biological requirements of ESUs are being met. VSPs are independent populations that have a negligible risk of extinction due to threats from demographic variation local environmental variation, and genetic diversity changes over 100 years (McElhany *et al.* 2000).

The attributes associated with VSPs include adequate abundance, productivity, population growth rate, population spatial scale, and diversity. These attributes are influenced by survival, behavior, and experiences throughout the entire life cycle and are therefore distinguished from the more specific biological requirements associated with the action area and the particular action under consideration. Species-level biological requirements are influenced by all actions affecting the species throughout its life cycle and may be broader than the requirements of any specific independent population in the ESU. The action area effects must be reviewed in the context of these species-level biological requirements to evaluate the potential for survival and recovery, relevant to the status of the species and given the comprehensive set of human activities and environmental conditions affecting the species.

Recent information reviewed by NOAA Fisheries indicates that the species level biological requirements are not being met in any of the ESUs studied for 12 species of ESA-listed salmon and steelhead in the Columbia-Snake River basins (NMFS 2000). Given the low abundance levels in these ESUs, population growth rates must increase to reach the critical threshold or recovery abundance levels, and in the long term, must remain high enough to maintain a stable return rate and keep populations at acceptable abundance levels (NMFS 2000).

<u>Habitat Elements</u>
Habitat-altering actions continue to affect salmon and steelhead population viability by affecting the physical, chemical, and biological parameters central to salmon survival in freshwater ecosystems (NMFS 1999). For actions that affect freshwater habitat, NOAA Fisheries defines the biological requirements of the species in terms of a concept called properly function condition (PFC) (NMFS 1996). PFC refers to the sustained presence of natural habitat forming processes in a watershed that are necessary for the long-term survival and recovery of MCR steelhead through the full range of environmental variation. Natural habitat forming processes include, but are not limited to, bedload transport, large woody debris recruitment, and riparian

vegetation succession, and most of these processes are driven by water. PFC constitutes the habitat component of a species' biological requirements.

Whether species biological requirements are expressed in terms of population variables or habitat components, a strong causal link exists between the two (NMFS 1996). Actions that affect habitat have the potential to effect population abundance, productivity and diversity, and these effects can be severe when populations are at low levels. The importance of this relationship is highlighted by the fact that freshwater habitat degradation is identified as a factor for decline in every salmon listing on the West Coast (NMFS 1996).

By analyzing the effects of a given action on the habitat portion of a species biological requirements, NOAA Fisheries is able to gauge how that action will affect the population variables that constitute the rest of a species' biological requirements, and ultimately, how the action will affect the species' future health.

2.1.2.2 MCR Steelhead

NOAA Fisheries has determined that actions permitted using the proposed RMS plans are "likely to adversely affect" the 12 ESUs considered in this Opinion. All of the ESA-listed salmon and steelhead considered in this consultation rely on conditions in the Columbia River for migration and thus may be affected by the quality and quantity of water discharged from the Tri-County area. However, MCR steelhead use the Deschutes and John Day Rivers for spawning and rearing life stages. This ESU will be more directly affected by land and water uses within the action areas than the other ESUs. Further details regarding the life histories, factors for decline, and current range wide status of these species are also found in NMFS (2000). Information presented here for the MCR steelhead ESU is adapted from Appendix A to the paper "A Standardized Quantitative Analysis of the Risks Faced by Salmonids in the Columbia River Basin" (McClure *et al.* 2000).

The MCR steelhead ESU occupies the Columbia River Basin from above the Wind River in Washington and the Hood River in Oregon and continues upstream to include the Yakima River, Washington. The region includes some of the driest areas of the Pacific Northwest, generally receiving less than 16 inches of precipitation annually (Jackson 1993). Summer steelhead are widespread throughout the ESU; winter steelhead occur in Mosier, Chenowith, Mill, and Fifteenmile creeks, Oregon, and in the Klickitat and White Salmon Rivers, Washington. The John Day River probably represents the largest native, natural spawning stock of steelhead in the region.

Estimates of historical (pre-1960s) abundance specific to this ESU are available for the Yakima River, which has an estimated run size of 100,000 (WDF *et al.* 1993). Assuming comparable run sizes for other drainage areas in this ESU, the total historical run size may have exceeded 300,000 steelhead.

Most fish in this ESU smolt at two years and spend one to two years in salt water before re-entering freshwater, where they may remain up to a year before spawning (Howell *et al.* 1985). All steelhead upstream of the Dalles Dam are summer-run (Chapman *et al.* 1994). The Klickitat River, however, produces both summer and winter steelhead, and age-2-ocean steelhead dominate the summer steelhead, whereas most other rivers in the region produce about equal numbers of both age-1- and 2-ocean fish. A nonanadromous form co-occurs with the anadromous form in this ESU; information suggests that the two forms may not be isolated reproductively, except where barriers are involved.

The only substantial habitat blockage now present in this ESU is at Pelton Dam on the Deschutes River, but minor blockages occur throughout the region. Water withdrawals, overgrazing and degradation of riparian storage capacity have seriously reduced summer flows in many of the principal summer steelhead spawning and rearing tributaries of the Deschutes River. This is significant because high summer and low winter temperatures are limiting factors for salmonids in many streams in this region (Bottom *et al.* 1984).

Continued increases in the proportion of stray steelhead in the Deschutes Basin is a significant concern. The ODFW and the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO) estimate that 60 to 80% of the naturally-spawning population consists of strays, that greatly outnumber naturally produced fish. Although the reproductive success of stray fish has not been evaluated, their numbers are so high that significant genetic and ecological effects on natural populations are likely (Busby *et al.* 1999). The negative effects of any interbreeding between stray and native steelhead will be exacerbated if the stray steelhead originated in geographically distant river basins, especially if the river basins are in different ESUs. The populations of steelhead in the Deschutes Basin include steelhead native to the Deschutes River, hatchery steelhead from the Round Butte Hatchery on the Deschutes River, wild steelhead strays from other rivers in the Columbia Basin, and hatchery steelhead strays from other Columbia Basin streams. A tagging study suggests that a large fraction of the steelhead passing through Columbia River dams have entered the Deschutes River and then returned to the mainstem Columbia River (Cramer *et al.* 2002). A key unresolved question about the large number of strays in the Deschutes basin is how many stray fish remain in the basin and spawn naturally.

For the MCR steelhead ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) between 1980 and 2000 ranges from 0.88 to 0.75, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure *et al.* 2000).

2.1.2.3 Environmental Baseline

Regulations implementing section 7 of the ESA (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, state, or private actions and other human activities in the action area. The environmental baseline also includes the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation, and the impacts of state and private actions that are contemporaneous with the consultation in progress. The action area is defined in 50 CFR 402.02 to mean "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action."

The action area for this consultation includes all fields and pastures that will be affected by the completion of individual farm and ranch conservation plans described in the subject RMS. However, as described in following sections, the frequency, duration, and intensity of vegetation removal, soil movement, and other short-term adverse effects caused by the installation and maintenance of conservation practices called for by these plans are small compared to the recovery rate of most riparian and aquatic habitats. Moreover, those effects will be planned to occur during times that will affect as few individuals of ESA-listed species as possible.

The distance these small disturbances can travel before reaching an aquatic habitat yet still have a meaningful adverse effect will vary according to the particular practice (or practices) applied, slope gradient, slope length, soil type, the presence of landscape features like depressions or ditches, aquatic habitat characteristics, and other site-specific factors. Nonetheless, based on the maximum width typically recommended for vegetated buffers designed to protect aquatic habitats from the effects of agriculture and livestock grazing nearby (see, USDA and NRCS 1999; Spence *et al.* 1996; FEMAT 1993; Castelle *et al.*1992; Johnson and Ryba 1992), NOAA Fisheries assumes that any adverse effects to ESA-listed species and their critical habitats will be limited to those caused by conservation practices installed within 328-feet (100 meters) of wetlands and on either side of perennial or seasonal streams that (1) are within the present or historic range of an ESA-listed species, or (2) are within 0.5 miles upstream of that range and physically connected to it by an above-ground channel that will deliver water, sediment, or woody material to an area occupied by ESA-listed species.

Any adverse effects of conservation practices installed more than 328-feet from the edge of, or more than 0.5 miles upstream of, a habitat occupied by ESA-listed species are likely to be insignificant or discountable because they will be absorbed by the environment before reaching the wetland or stream, or contained by other conservation practices and buffers strategically placed alongside the waterbody. Conversely, the long-term effects of upland conservation practices are likely to be wholly beneficial because they will increase the overall capacity of the conservation plan to achieve and sustain riparian and aquatic habitat functions at levels described in the salmon quality criteria. Thus, use of conservation practices in the upland portion of the action area will add a significant extra margin of protection to the buffering capacity and habitat functions of the farm and ranch conservation plans without a corresponding risk of disturbance.

The decline of ESA-listed salmon and steelhead in the Mid-Columbia region is a result of many anthropogenic and nonanthropogenic factors that have operated over a long period of time, including hydropower operations, harvest, hatchery operations, timber harvest, agricultural activities, and habitat modification and natural variation in climate and ocean conditions. Restoration of species requires immediate actions to prevent further declines and the use of sustained comprehensive conservation planning and actions to rebuild and maintain them over the long term (NMFS 2000). Existing and on-going habitat restoration efforts in this region focus on the restoration of watershed function, particularly with respect to the water resource (NRCS 2001, 2002).

The action areas consists of highly altered and intensively managed landscapes within two geographic provinces or ecosystems: the East Cascade Slope and Foothills system and the Columbia Plateau. The region is characterized by hot, dry summers and cold harsh winters, and the landscape consists of flat or rolling topography cut by the steep canyons of the tributaries to the lower John Day and Deschutes River systems. Annual precipitation ranges from 8 to 16 inches depending on elevation and most falls as snow from November to March. Streamflow is generated from snow melt runoff in the upper elevations and from ground water discharge through springs and seeps in many of the tributaries (OPB 2000).

Land and water use in this region have caused watershed-scale changes in vegetation cover, soil quality, and hydrologic regimes. Logging, grazing and agricultural practices have each contributed to significant soil loss, gully development, stream channel instability, and loss of soil fertility and organic matter, with adverse effects to agricultural and anadromous fish production alike (OPB 2000; NMFS 2000).

<u>Columbia Plateau Region</u>

All of Sherman and Gilliam Counties, and the eastern half of Wasco County, are within the Columbia Plateau ecosystem. The plateau is formed from lava flows up to two miles thick. Flood waters from the Pleistocene Bretz floods surged across the Columbia River plateau, eroding some places and covering others with great thickness of sand and gravel. Winds swept and scoured this floodplain, depositing a deep mantle of silt and sand across the plateau. The huge scale of geologic events produced a landscape of gently rolling lands, deep soil, and cross-cutting rivers, that through time has evolved to include land forms such as steep rugged canyons and many breaks, cliffs and rims.

Much of the region's natural vegetation is native bunch grass prairie with areas of bitter brush steppe and western juniper. Riparian vegetation included black cottonwood, willows, chokecherry and aspen with wetlands dotting the plateau (OPB 2000). Currently the plant community is dominated primarily by grassland having very few trees. Average annual precipitation in this region ranges from 8 to 12 inches. The Columbia Plateau ecoregion has undergone extensive change over the last 150 years, and is second only to the Willamette valley in the extent of landscape change. A significant portion of the former sagebrush steppe, grassland and riparian communities have been converted to dryland wheat. The Columbia Plateau has been cultivated since the early 1870's. Travelers along the Oregon Trail found vast natural grasslands on the plateau, with deep fertile soils and adequate water for farming and homesteading. As early as the 1920's, farmers began expressing concerns about increased erosion, lowered crop yield and reduced grain protein according to a study by the NRCS (in OPB 2000). Cropland in grain-fallow rotation on the sandy soils along the Columbia River can experience wind erosion averaging 1 to 4 tons per acre per year, and Dry Croplands in grain-fallow rotation on loess soils can experience from 2 to over 8 tons per year from water erosion alone. The seriousness of soil losses become evident when equated to a soil profile thickness, that varies from 1.5 to 5-feet deep over most of the cropland. On the shallower soils, the NRCS has determined that loss must be less than 2 tons per acre per year to avoid long-term loss of soil fertility. During fallow years, some steep uncovered slopes can lose one inch of topsoil in one season and by 1992, it was estimated that the Columbia Plateau had lost 68% of its topsoil.

The intensive land use changes that have visited the Columbia Plateau region have also altered the hydrologic cycle of the region. The removal of vegetation from the landscape and riparian corridors, uncontrolled grazing, and mechanized agriculture resulted in increased vulnerability of soils to erosion and reduction in infiltration capacity of the soils. Runoff events are now more severe (flashier) for the same amount of rainfall. This destabilizes stream channels by scouring beds and eroding banks.

The resource conditions in this region have prompted numerous changes in private land agricultural practices and increased conservation assistance to landowners from the NRCS. Changes in agricultural practices, for example from tillage to no-till operations, have documented effects on soil infiltration capacity, organic matter content, and reduced soil loss. More than 95% of agricultural producers on private lands in the Tri-County region participate in USDA farm programs, including the Conservation Reserve Program (CRP), the Environmental Quality Incentive Program (EQIP), the Conservation Reserve and Enhancement Program (CREP) and others (NRCS 2002). The geographic scope of these programs covers more than 75% of the affected land area (NRCS 2002). To date, the CREP program has been implemented on approximately 2,042 acres in Wasco County.

<u>Major Land Resource Areas in the Columbia Plateau Region</u>

The Columbia Plateau region has been further classified by the NRCS according to common resource areas (CRAs) based on similarities of microclimate, landform, geology, soils, vegetation and other resources. Because of these similarities, landscapes within the same CRA also have the same kinds of resource issues or concerns. For example, loess soils that are considered highly erodible. Geographically associated CRAs are assembled into MLRAs, that serve as the basis for agricultural planning in the region (Table 4).

The Columbia Plateau portion of the Tri-County region consists of five MLRAs (Table 4). The dominant MLRA for non-irrigated cropland in the region is MLRA 8, with seven subdivisions. The major resource concerns are wind and water driven soil erosion resulting from the combination of thin loess or silt loam soils, sparse vegetation cover and cropland lacking cover or residue. MLRAs 6, 9, and 10 are considered grazing lands although vegetation cover differs substantially. For example with ponderosa pine dominates MLRA 6 and rolling foothills and valleys characterize MLRA 9 and 10. The major resource concerns are water and wind driven soil erosion from grazing lands that lack cover or residue or have reduced soil infiltration capacities.

A small portion of the action area in Wasco County is found in the East Cascades Slope and Foothills Ecoregion. This ecoregion is a transition zone that extends from below the crest of the Cascade Range east to where the pine forests transition into sagebrush-juniper steppe.

Federally-managed forests cover the upper portions of the watersheds with privately managed agricultural lands in the valleys. The primary MLRA in this region is MLRA 7, characterized by densely forested landscapes dotted with alpine lakes.

Most of the runoff in the western portion of Wasco County comes from year-round springs on the east flanks of the Cascade Mountains, that provide a relatively stable flow of cold, clean water. In the mid-to-late 1800's, riparian areas within this part of the action area were protected from drought by this year-round supply of water. Diversion of water from the many streams in this region and degradation of stream-side vegetation has contributed to reduced stream flows and raised stream temperatures.

Table 4. Major Land Resource Areas for Gilliam, Sherman and Wasco Counties, Oregon

MLRA	Description	Major Land Use	Major Resource Concern
MLRA 6	Five subdivisions. Forested with ponderosa pine, lodgepole pine, douglas fir and oak. Soils are derived from ash-mantled lava flows	Grazing	Erosion
MLRA 7	Two subdivisions. Lowest elevation in action area; soils are dominantly sand, sandy loam with some silt loam textures.	Irrigated Cropland	Erosion during the spring and fall where cover crops and residue are absent
MLRA 8	Seven subdivisions, five present in action area; shallow soils with rock outcrop; loess-mantled basalt plateaus; and valleys with moderately deep to very deep silt loam	Non-Irrigated Cropland	Erosion on sloping soils lacking residue or cover, especially during winter
MLRA 9	Six subdivisions, one present in the action area; shallow and moderately deep soils on gently to steeply sloping hills and mountains adjacent to forest land	Non-Irrigated Cropland Livestock Grazing	Erosion on sloping soils lacking residue or cover, especially during winter
MLRA 10	Nine subdivisions, one present in action area; rolling foothills and valleys with moderately deep silt-loam soils	Irrigated crops, hay, & pasture	Erosion on sloping soils lacking residue or cover; sodium and salt build-up in soils

The range of land uses in the Columbia Plateau region are also present in this ecoregion, and have contributed to degraded stream courses, elevated water temperatures, water quality degradation, and flow modification. Altered riparian and wetland structure has diminished functions such as filtering and cleaning water and moderating the effects of floods and drought. Wetlands have been affected by water diversions, withdrawals and excess nutrient inputs associated with agriculture and population growth.

2.1.3 Analysis of Effects

Effects of the action are defined as "the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with the action, that will be added to the environmental baseline" 50 CFR 402.02. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

As outlined above, RMS plans include a set of CPs that describe management and structural practices necessary to ensure that the production system for a specific farm or ranch will be sustainable. Many of these CPs have similar purposes and environmental effects, although they may differ in the details of specific applications. Therefore, to help simplify the presentation of this effects analysis, NOAA Fisheries has divided these CPs into general groups according to their function (Table 5).

Individual components or actions of some CPs may have a significant or unpredictable adverse effect on riparian and aquatic habitats that can only be understood if analyzed at the site specific scale. These actions may still be part of a Dry Cropland or Range and Pastureland RMS, but must be analyzed case-by-case as part of an individual consultation. As discussed more fully in the terms and conditions section of this Opinion, the following actions are not covered by this Opinion.

1. Any practice that will restrain the free passage, upstream and downstream, of adult and juvenile salmon and steelhead.
2. Use of treated wood where it will contact flowing water or will be physically abraded into flowing water.
3. Pesticide applications.
4. Streambank stabilization methods not explicitly authorized by this consultation.
5. Construction of new or upgraded water control structures in perennial stream channels or fish-bearing waters (*e.g.*, dams, dikes, levees, channelized streams, grade control structures, weirs, sediment ponds, bulkheads, revetments).
6. Construction of new, permanent roads in riparian areas.
7. Any new water diversion or water use, except for off-channel livestock watering.
8. Any other component of a CP that the NRCS determines may prevent or delay achievement the salmon quality criteria.

Table 5. Conservation Practices for Dry Cropland and Range and Pastureland RMS.

Functional Group	Practice
Stream Improvement To prevent loss or damage to land uses near streams, and support riparian and aquatic habitat functions.	395 Stream Habitat Improvement and Management 396 Fish Passage 580 Streambank and Shoreline Protection
Conservation Buffer To limit landscape-level discharges caused by the cumulative effects of active cropping/rangeland use and episodic events. Riparian conservation buffers placed next to wetlands and waterways to provide essential aquatic habitat features.	327 Conservation Cover Establishment 332 Contour Buffer Strip 380 Windbreak/Shelterbreak Establishment 390 Riparian Herbaceous Cover 391 Riparian Forest Buffer 422 Hedgerow Planting 601 Vegetative Barriers 612 Tree/Shrub Establishment 650 Windbreak/Shelterbelt Renovation
Erosion Control To reduce sheet, rill and gully erosion at field edges by trapping sediment; also reduce polluted surface runoff by trapping other pollutants.	342 Critical Area Planting 350 Sediment Basin 362 Diversion 386 Field Border 393 Filter Strip 402 Dam, Floodwater Retarding 410 Grade Stabilization Structure 412 Grassed Waterway 638 Water and Sediment Control Basin 620 Underground Outlet 600 Terrace
Dry Cropland Management To reduce pests, erosion and runoff, and to improve input efficiencies.	324 Deep Tillage 328 Conservation Crop Rotation 329a Residue Management, No-till/Strip Till 329b Residue Management/Mulch Till 330 Contour Farming 585 Contour Strip Cropping 586 Stripcropping 590 Nutrient Management 595 Pest Management 777 Residue Management Direct Seed

Functional Group	Practice
<u>Forage Improvement and Protection</u> To improve forage and manage the composition and structure of rangeland vegetation.	314 Brush Management 338 Prescribed Burning 394 Firebreak 512 Pasture and Hay Planting 550 Range Planting 595 Pest Management 612 Tree/Shrub Establishment 512 Pasture and Hay Planting
<u>Livestock Management</u> To improve forage and manage the composition and structure of rangeland vegetation.	362 Diversion 382 Fences 472 Use Exclusion 516 Pipeline 528a Prescribed grazing 561 Heavy Use Protection 574 Spring Development 575 Animal Walkways and Trails 614 Watering Facility 642 Water Well
<u>Wildlife Management</u> To provide habitat for a variety of wildlife species.	643 Restoration and Management of Declining Habitats 645 Upland Wildlife Habitat Management 647 Early Successional Habitat Development/ Mgt 648 Wildlife Watering Facility

2.1.3.1 Effects of the Proposed Action

From a watershed perspective, the Dry Cropland and Range and Pastureland RMS plans have many similar effects on soil and water resources. As detailed below, each RMS can have significant, short- and long-term effects on aquatic habitat access, water quality, water quantity, channel morphology, and other physical conditions on riparian and aquatic habitats in the action area. However, an RMS that is properly designed using salmon quality criteria and fully carried out with careful attention to the response of riparian and aquatic habitats will reduce upland erosion and runoff, promote riparian succession, and help to create and maintain the kinds of chemical and physical conditions in riparian and aquatic habitats that are necessary to recover ESA-listed salmon and steelhead populations. Moreover, it cooperators voluntarily apply salmon quality criteria and indicators (as applicable) to complete an RMS plan on land upslope of the action area, the effects are likely to be wholly beneficial for listed species. This means that completion of an RMS plan upslope of the action area will affect riparian and aquatic habitat functions, such as streambank stabilization, sediment filtering, chemical removal, large organic debris supply, particulate organic matter production, and shade protection, but those adverse effects will be near 'background levels' described in the salmon quality criteria, that is, the same effects as if no anthropogenic land use was occurring nearby. Nonetheless, the upslope portion of the RMS will provide an extra margin of protection to the buffering capacity and habitat functions of the riparian and aquatic area and ensure that the overall RMS is effective to reduce pollutant discharges associated with dry cropland and livestock management actions, and with the high energy and runoff associated with episodic storms.

Some CPs within each RMS require installation or maintenance of agricultural infrastructure or management practices in riparian areas or below ordinary high water, including access by livestock, equipment or heavy machinery. This may increase short- and long-term sedimentation with significant effects for instream habitats and aquatic species. Fine sediment can act as a physical barrier to fry emergence (Cooper 1959, 1965; Wickett 1958; McNeil and Ahnell 1964; Koski 1972; NRCS 1995b), and McHenry *et al.* (1994) found that fines (>13% of sediments < 0.85mm) resulted in intra gravel mortality of salmonid embryos due to oxygen stress and metabolic waste build-up. Sediment can cover intra gravel crevices that juvenile salmonids use for shelter, thus decreasing the carrying capacity of streams for juvenile salmon (Cordone and Kelley 1961; Bjornn *et al.* 1974). Sediment may also physically abrade and mechanically disrupt respiratory structures (fish gills) and respiratory epithelia of benthic macroinvertebrates (Rand and Petrocelli 1985).

Fine sediment can also affect juvenile salmonid prey by reducing accessibility to microhabitats by embedding the edges of gravel and cobbles (Brusen and Prather 1974) and entombing benthic organisms that die due to depleted supplies of dissolved oxygen. When fine sediment is deposited on gravel and cobble, benthic species diversity and densities drop significantly (Cordone and Pennoyer 1960; Herbert *et al.* 1961; Bullard 1965; Reed and Elliot 1972; Nuttall and Bilby 1973; Bjornn *et al.* 1974; Cederholm *et al.* 1978; NRCS 1995b). Reduced prey availability can contribute to reduced growth and survival of juvenile salmonids.

Sediment deposition, elevated nutrients levels and increased temperatures lead to decreased levels of dissolved oxygen (DO). In addition to the potential lethal effects of low DO, juvenile salmonids also show sublethal effects. Bjornn and Reiser (1991) determined that growth and food conversion efficiency are affected at DO levels of <5mg/L. Phillips and Campbell (1961) determined that DO levels must average greater that 8mg/L for embryos and alevins to have good survival rates. Silver *et al.* (1963) and Shumway *et al.* (1964) observed that salmonids reared in water with low or intermediate oxygen levels were smaller sized and had a longer incubation period than those raised at high DO levels. Low DO levels increased the incubation periods for anadromous species, and decreased the size of alevins (Garside 1966; Doudoroff and Warren 1965; Alderdice *et al.* 1958).

The effects of sediment delivery to streams as described will primarily effect MCR steelhead as they are the only ESA-listed species to use the John Day and Deschutes basins. Other ESA-listed salmon and steelhead will be adversely effected by sediment delivery to the mainstem

Columbia River. These effects will be variable and transitory, depending on the species life-stage and background turbidity levels.

Effects of Dry Cropland RMS

Dry Cropland RMS plans and associated practices are largely designed to maintain and improve soil quality for production of crops. For example, the spatial layout of crop planting is influenced by Contour Farming (CP330), seeding is covered by Residue Management Direct Seed (CP777), and the fertilization is directed by Nutrient Management (CP590). However, dry cropland agriculture can significantly alter runoff and erosion rates to streams, and adversely affect the ecological functions of riparian and aquatic habitats. Thus, the Dry Cropland RMS is also intended to avoid or minimize adverse effects to waterways through the proper selection, and comprehensive implementation of individual conservation practices. Practices for the Dry Cropland Management, Conservation Buffer, and Erosion Control practices all influence soil quality and the reduction of soil loss. Improving and maintaining upland soils and hydrology reduces surface runoff and erosion.

Most effects of Dry Cropland use occur through long-term changes to hydrology, soil erosion, and riparian habitat composition and functions such as shade and bank stability. These longer-term effects adversely affect the quality of instream and riparian habitats. Crop production can degrade soil structure and hydrology (NRCS 2002), in turn altering flow regimes and sediment delivery rates that adversely affect ESA-listed salmon and steelhead within the action area, particularly MCR steelhead. Soil degradation can increase sediment levels within streams, often by the alteration of the hydrologic regime. Despite gradually enhanced practices over the past several decades to minimize soil degradation and loss, the continued mechanical mixing, and aeration can fundamentally alter soil characteristics and soil microorganisms (Spence *et al.* 1996; NRC 1993).

Various forms of tillage and crop management are major components of the Dry Cropland RMS. Repeated mechanical mixing and aeration significantly alter physical soil characteristics and soil microorganisms and renders a uniform characteristic to soils in the cropped areas. Although tillage aerates the upper soil, compaction of fine textured soils typically occurs just below the depth of tillage, decreasing infiltration of water to deep aquifers. In addition, fields with no vegetative cover (fallow) between cropping seasons can yield elevated sediment levels as soil mobilization occurs from wind and water erosion. Fine sediments from water erosion that are not delivered to surface waters typically fill soil interstices, that reduces infiltration and increases overland flow (NRC 1993). In turn, sheet and rill erosion is exacerbated. Reduced infiltration and the rapid routing of water from croplands can increase the frequency and relative size of flood flows (Hombeck *et al.* 1970) and lower the water table, resulting in decreased base flows during low flow periods. Typically, springs, seeps, and headwater streams can dry up and disappear, especially when wetlands have been ditched and drained (NRC 1993). Bare soils can retain greater heat energy than vegetated soils, thus increasing conductive transfer of heat to water that flows overland to surface waters or infiltrates the soil (Spence *et al.* 1996). Other activities requiring farm machinery to traverse the cropped lands and roads along crop margins causes further compaction, reducing infiltration and increasing surface runoff. Soil erosion rates are generally greater from croplands than from other land uses but vary with soil type and slope.

Agricultural lands can contribute substantial quantities of sediment to streams. For example, in 1984 the NRCS, formerly known as the Soil Conservation Service, estimated that 92% of the total sediment yields in the Snake and Walla Walla River basins of southeastern Washington resulted from sheet and rill erosion from croplands that accounted for only 43% of the total land area (SCS, USFS and ERS 1984). Dry Cropland agriculture can smooth and loosen the land surface, enhancing the opportunity for surface erosion.

To determine the extent of soil loss within the Dry Cropland RMS planning unit, the NRCS uses the Revised Universal Soil Loss Equation (RUSLE) to calculate sheet and rill erosion from water, and the Wind Erosion Equation (WEQ) to estimate soil loss from wind. The NRCS then designs the RMS with a soil loss goal based on a maximum rate of sustainable soil loss tolerance factor, referred to as 'T'. Sustainable soil loss is defined by the NRCS as an annual rate of soil erosion that if exceeded would remove soil from the landscape faster that it is being formed. This standard for soil loss was set to ensure that agricultural production would remain viable over the long term. T soil loss can range from one to five tons per acre per year. The NRCS has monitored and estimated soil loss in the Deschutes and John Day river basins for several decades. Modeled results generally show a reduction in soil loss from pastureland, cropland and land enrolled in the conservation reserve program over the past two decades (NRCS 2001). The NRCS has also estimated the amount of acres within these same categories within each basin that meet or exceed the T soil loss goal. Estimates for 1997 sheet and rill erosion show that approximately 15% of these lands exceed T within the Deschutes, while 32% exceed T within the John Day (NRCS 2001).

While the continued use of T by the NRCS for planning purposes is likely to lead to a reduction in soil loss relative to baseline conditions, NOAA Fisheries has insufficient data to conclude that T is an adequate standard for long term planning purposes on Dry Cropland areas covered by this Opinion. Many spawning and rearing habitats within the Deschutes and John Day River basins have been degraded, in part, from elevated sediment levels. Recognizing that soil loss from planning units does not necessarily equate to sediment delivery to streams (*i.e.* wind or rain runoff can deliver soils to nearby fields) instream baseline conditions for sediment levels may dictate that the reduction of soil loss beyond the traditional standard for T may be appropriate within individual subbasins or planning units covered by the RMS to achieve applicable salmon quality criteria.

To achieve T soil loss goals, the Dry Cropland RMS includes a variety of practices that minimize and avoid soil and hydrological degradation. These are used to enhance soil quality through increased retention of organic matter within soils and between crops on the surface of the soil. Soils with high organic matter retain more moisture than degraded soils (USCC 1997), thus reducing sheet and rill erosion. The Dry Cropland Management practices also reduce sheet and rill erosion by planting crops at contours relative to local topography to encourage infiltration of rainfall. Some of these practices also alternate crops or fallow land with strips of grass or close growing crops to enhance soil retention by increasing infiltration and trapping of mobilized sediment. Many Dry Cropland soils have been compacted, often resulting in increased runoff, soil loss and decreased crop production. Deep Tillage (CP324) is used to break up soils that have excessive compaction problems.

The Conservation Buffer functional group consist of practices to establish permanent strips of land in various types of vegetation. These protect against the cumulative effects of many small but unavoidable pollutant discharges associated with dry cropland and range and pastureland actions, and the kinds of catastrophic pollution associated with the high energy and runoff associated with episodic storms. The type of vegetation is dependant on the conservation buffers intended purpose. Upland windbreak buffers use larger shrub and tree species to prevent soil loss, while various shrub and grass species are used to prevent or mitigate overland surface flow of runoff. Vegetative cover minimizes erosion through increased infiltration of rainfall, and roots bind soils preventing sediment mobilization from sheet or rill erosion and wind.

Together, the Dry Cropland Management and Conservation Buffer functional groups reduce sediment in runoff. However, each RMS will need additional practices to prevent sediment from reaching surface waters, especially where wheat crops require extended periods of fallow ground and where riparian areas are already degraded. As stated in the BA, the amount of sediment delivered to streams will largely depend on the combination of upland and riparian practices between the cropped area and stream (NRCS 2002). Erosion Control practices are designed to moderate sediment delivery to streams by slowing surface water runoff, often in small gullies and ephemeral waterways that drain cropland. Slowing runoff velocities allows some suspended sediment to be deposited before reaching streams, and reduces in-channel erosion. However, Placing Erosion Control practices within the channel of perennial streams and/or fish bearing waterways could impede fish passage, and alter channel migration and bedload movement. The Floodwater Retarding Dam (CP 402) and Grade Stabilization Structure (410) are examples of such practices. However, the proposed action does not include use of these practices in perennial stream channels or fish-bearing waterways. Rather, Erosion Control CPs are proposed only for use within gullies and other erosional features associated with ephemeral waterways.

Effects of the Range and Pastureland RMS

Range and Pastureland RMS plans consist of CPs associated with livestock management and forage improvement and protection. For example, the rotation and movement of livestock within and between specific pastures are addressed in Prescribed Grazing (CP528a), Fence (CP382), Animal Trails and Walkways (CP575), Water Well (CP642), and Spring Development (CP574). The core of this RMS is the Prescribed Grazing (CP528a) practice. Prescribed grazing balances the type and number of livestock, their distribution, and the season and timing of grazing against site production limitations, the physiological needs of forage plants, and other ecological factors (NRCS 2002). Adverse effects of livestock grazing typically result from imbalances among these factors and can include soil compaction, loss of organic matter, reduced plant vigor, accelerated erosion, and degraded riparian and aquatic habitats (NRCS 2002). The Range and Pastureland RMS combines a variety of CPs to correct these conditions.

Direct effects of livestock grazing on ESA-listed salmon and steelhead occur when livestock enter streams occupied by those species to rest, drink, or cross the stream. During the early phases of their life cycle, salmon and steelhead have little or no capacity for mobility, and large numbers of embryos or young are concentrated in small areas. Belsky *et al.* (1997) reviewed the effects of livestock entering fish spawning areas where they may step on redds, and destroy or dislodge embryos and alevins. Although proper grazing systems can prevent livestock from wading in streams,[4] any cow that does step on a redd may be assumed to induce mortality on eggs and pre-emergent fry that is at least as significant as that demonstrated for human wading (Roberts and White 1992). In this investigation, a single wading incident on a simulated spawning bed induced 43% mortality of pre-hatching embryos. In a recent (July 12, 2000) occurrence of unauthorized livestock grazing in the Malheur National Forest in Eastern Oregon, cattle trod on five of five documented MCR steelhead redds in a meadow area of Squaw Creek in the Middle Fork John Day River subbasin (USFS 2000).

Cattle entering a riparian or stream habitat for shade, forage, drinking water, to cross the stream, or for other purposes may cause juvenile salmon and steelhead to leave areas near stream side cover. Once these juveniles leave cover and swim into open water, they become more susceptible to predation from larger fish and avian predators. These effects will be prevented by scheduling of grazing to avoid grazing near spawning areas during the spawning season. CPs in the Livestock Management functional group will be used to prevent livestock from stepping on redds by limiting or excluding grazing in riparian areas. Other forms of take such as harassment of MCR steelhead by livestock when livestock enter or are beside occupied habitat, resulting in MCR steelhead avoidance can also be addressed through the Riparian Access Control and Off Channels Watering practices. Harassment is reduced, in the long term, by Range and Pastureland RMS management that results in better riparian and in-channel habitat conditions necessary for MCR steelhead survival and recovery.

A reduction or degradation of vegetative cover can increase sediment delivery to streams. Grazing animals affect vegetation primarily through browsing and breaking or crushing. Grazing animals are selective in what they eat. Consequently, preferred vegetation types are generally removed first, followed by less palatable species. Heavy, continual grazing causes plants to be partially or wholly defoliated, thus reducing biomass, plant vigor, and seed production (Kauffman 1988; Heady and Child 1994). These effects can effect the compositions and functions of riparian areas. Selection of specific plant species may allow other taxa to dominate (Kauffman and Krueger 1984; Fleischner 1994). In addition to defoliation by grazing, vegetation may also be lost or damaged by treading that tears or bruises leaves and stems, and may break stems of woody plants. Regeneration of some woody vegetation, such as willow, cottonwood, and aspen, is inhibited by browsing on seedlings (Fleischner 1994).

[4] See, Letter from Bob Graham, NRCS, to Mike Crouse, NOAA Fisheries (October 3, 2003)(providing comments on draft biological opinion and quoting a personal communication from Jim Eisner, BLM Prineville District, to Ron Graves, Wasco SWCD).

The Forage Improvement and Protection practices described in Table 5 are used to restore plant communities similar to historic climax conditions or provide desired forage vegetation, and remove, or reduce non-herbaceous plants. Prescribed Burning (CP338) is used to control woody vegetation in uplands and to help reestablish and maintain desirable species composition and structure in upland and riparian areas. The effects of prescribed burning include temporary removal of flammable above-ground biomass and promotion of conditions that are more favorable for the establishment and growth of desired plant species. Prescribed Grazing (CP528a) can also be used to rotate animals to ensure that vegetative communities are not damaged.

Livestock grazing also influences vegetation by modifying soil characteristics. Hooves compact soils that are damp or porous, inhibit the germination of seeds and reduce root growth (Heady and Child 1994). Changes in infiltration capacity associated with soil compression due to livestock lead to more rapid surface runoff, lowering moisture content of soil and the ability of plants to germinate or persist (Heady and Child 1994). However, livestock can displace or break up surface soils, thus allowing for greater infiltration of water and helping to cover seeds (Savory 1988, in Heady and Child 1994). Loosening soils can also make them more susceptible to erosion. Heavily pulverized soil (dust) may become hydrophobic, reducing infiltration and increasing surface runoff.

Soils in arid and semi-arid lands have a unique microbiotic surface layer or crust of symbiotic mosses, algae, and lichens that covers soils between and among plants. This "cryptogamic crust" plays an important role in hydrology and nutrient cycling and is believed to provide favorable conditions for the germination of vascular plants (Fleischner 1994). In arid and semi-arid climates, the cryptogamic crust has been shown to increase soil stability and water infiltration (Loope and Gifford 1972; Kleiner and Harper 1977; Rychert *et al.* 1978). The hooves of livestock can break up these fragile crusts, and reformation may take decades. Anderson *et al.* (1982) found recovery of cryptogamic crusts took up to 18 years in ungrazed enclosures in Utah. Finally, livestock indirectly affect plant species composition by aiding the dispersion and establishment of nonnative species; seeds may be carried on the fur or in the dung of livestock (Fleischner 1994).

Prescribed Grazing (CP528a) is used to rotate animals throughout available land before soil and vegetation degradation. If proper spatial, temporal, and nutritional factors are incorporated, animals are moved on a rotation before adverse effects to soils and hydrology. The Forage Improvement and Protection practices also effect soil characteristics such as increased porosity and organic matter content by encouraging desired vegetative cover. An effective management tool for retaining vegetation is rotating animals based on soil type, rainfall, plant community composition and other site-specific resources. Regardless of seral stage, within riparian areas at least six inches of residual stubble or regrowth is recommended to meet the requirements of plant vigor maintenance, bank protection, and sediment entrapment (Clary and Webster 1989). More than six inches of stubble height may be required for protection of critical fisheries or easily eroded streambanks and riparian ecosystem function (Clary and Webster 1989). The retention of vegetation based on stubble height can ensure vegetation root survival, in turn protecting soil erosion from wind and precipitation. Prescribed Grazing (CP528a) is used to rotate animals from fields based on monitoring of stubble heights.

Range and pastureland soils are susceptible to compaction by livestock. The degree of soil compaction depends on soil characteristics, including texture, structure, porosity, and moisture content (Platts 1991; Heady and Child 1994), and the rotation of animals as directed by Prescribed Grazing (CP528a) and management of the producer. Generally, soils that are high in organic matter, porous, and composed of a wide range of particle sizes are more easily compacted than other soils. Similarly, moist soils are usually more susceptible to compaction than dry soils, although extremely wet soils may give way and then recover following compression by livestock (Clayton and Kennedy 1985). The result of soil compaction is an increase in bulk density in the top 5 to 15 cm of soil as pore space is reduced. Because of the loss of pore space, infiltration is reduced and surface runoff is increased, thereby increasing the potential for erosion. The available studies show that compaction generally increases with grazing intensity, but that site-specific soil and vegetative conditions are important in determining the response of soils to grazing activity (reviewed in Kauffman and Krueger 1984; Heady and Child 1994). Within each RMS, Prescribed Grazing (CP528a) is used to inventory site specific conditions and adjust animal use on spatial, temporal and relative volume scales to maintain and improve soil conditions. As such, soils that are more susceptible to compaction will be protected by limited animal numbers and/or time of use on particular management units.

If improper management leads to overgrazing, livestock also alter surface soils indirectly by removing ground cover and mulch and compacting soil. Kinetic energy from falling raindrops erodes soil particles, that may then settle in the soil interstices resulting in a less pervious surface. Livestock grazing can increase the percentage of exposed soil and break down organic litter, reducing its effectiveness in dissipating the energy of falling rain. The Forage Improvement and Protection practices are used to establish protective cover on grazing and rangeland, thus minimizing splash erosion. Prescribed Grazing (CP528a) is used to rotate animals before residual vegetation targets are exceeded. As part of the proposed action, the NRCS will ensure that all grazing plans include adequate rest to meet vegetation recovery and management goals (NRCS 2002).

Grazing can modify two fundamental hydrologic processes, evapotranspiration and infiltration, that affect the timing and yield of runoff from a watershed. Loss of upland and riparian vegetation results in reduced interception and transpiration losses, thus increasing the percentage of water available for surface runoff (Heady and Child 1994). Shifts in species composition from perennials to annuals may also reduce seasonal transpiration losses. As mentioned above, reductions in plant biomass and organic litter can increase the percentage of bare ground and can enhance splash erosion, that clogs soil pores and decreases infiltration. Similarly, soil compaction reduces infiltration. Rauzi and Hanson (1966) report higher infiltration rates on lightly grazed plots, compared with moderately and heavily grazed plots in South Dakota. Experiments in northeastern Colorado showed reductions in infiltration in heavily grazed plots, but no differences between moderately and lightly grazed plots (Rauzi and Smith 1973). Johnson (1992) reviewed studies related to grazing and hydrologic processes and concluded that heavy grazing nearly always decreases infiltration, reduces vegetative biomass, and increases bare soil. Decreased evapotranspiration and infiltration increases and hastens surface runoff, resulting in a more rapid hydrologic response of streams to rainfall. Some authors have suggested that the frequency of damaging floods has increased in response to grazing; however, there remains uncertainty about the role of grazing in mediating extreme flow events (reviewed in Belsky *et al.* 1999 and Fleischner 1994). The NRCS has included several practices that are intended to address adverse effects from soil and hydrological changes. The Forage Improvement and Protection practices are used to reduce adverse hydrologic affects by establishing vegetative cover, and divert runoff from critical areas, such as exposed soils. In addition, the Erosion Control practices can be used within a small ephemeral drainage to reduce and manage onsite and downstream runoff from exposed soils.

Devegetation and exposure of soil by improper grazing can result in detached soil particles during rainstorms, thus increasing overland sediment transport. Over grazing increases the potential for runoff and soil erosion. In areas where concentrated flow occurs, gullies can form. As gullies expand and deepen, streams downcut, the water table drops, and sediments are transported to depositional areas downstream (Elmore 1992; Fleischner 1994; Henjum *et al.* 1994). While the RMS plans can minimize adverse effects to soils and hydrology through the Prescribed Grazing (528a) practice (proper grazing rotations) and the Forage Improvement and Protection practices, more acute sedimentation can be addressed through the Erosion Control practices. Although the Erosion Control practices can benefit aquatic systems by mitigating relatively severe sediment mobilization from increased water yield, if implemented within seasonal or intermittent streams they can impede fish migration, and the downstream movement of spawning gravels, organic matter and large wood. In addition, they can require periodic dredging maintenance, that can mobilize sediment to downstream fish bearing waters. Provided these practices are implemented in small ephemeral (non fish bearing) water ways, they can be a viable tool to address adverse effects until longer term management changes such as proper rotations, rest, and vegetation establishment on bare ground are allowed to take effect.

In areas under historic season-long grazing, major vegetation changes have taken place with changes in livestock use. To adequately minimize adverse effects, each RMS will prescribe ecologically conservative grazing systems with good range management practices, such as adequate fencing, good distribution of water and salt, and adequate riding to ensure uniform cattle distribution. Routinely grazing an area for too long or too late in the growing season can cause adverse changes in the plant community. Over time, entire plant communities can change as a result of heavy grazing pressure. Plants in the early seral stage community do not provide as much protection for the watershed and streambanks. Many forbs and annual plants that frequently dominate early seral plant communities do not have the strong deep root systems of the later seral perennials such as bunchgrasses, sedges, rushes, shrubs, and willows.

The proper selection and implementation of all of the functional groups, in conjunction with Prescribed Grazing (CP528a) as determined by site specific conditions, will determine the relative habitat protection provided by the Rangeland and Pastureland RMS. Based on plant phenology, the only grazing strategies generally considered to have a good chance to substantially minimize adverse effects and promote recovery of habitat functions to streams and riparian areas are light or tightly controlled uses such as winter-only grazing or riparian pastures with short, early-spring use periods, and certain strategies incorporating a full season rest (Platts 1991). Spring and winter season use generally produce better livestock distribution between riparian and upland areas due to flooding of riparian areas (resulting in limited access for cattle), the presence of palatable forage on the uplands, and alternative water sources (Leonard *et al.* 1997; Ehrhart and Hanson 1997; Kinch 1989). Myers (1989) concluded that good or excellent riparian conditions were maintained by grazing systems that do not allow livestock use during the hot season, and recommended grazing not be allowed during the hot summer months more than once every four years. Similarly, Clary and Webster (1989) stated grazing should be avoided during mid and late summer and recommend early grazing, followed by complete removal of livestock. Early grazing allows significant herbaceous regrowth to occur in riparian areas, reducing most grazing damage before higher flows occur the following spring or summer, and avoids adverse affects to woody plant species when livestock forage preference shifts occur.

<u>Effects to Riparian and Instream Habitat From Each RMS</u>
The adverse effects of crop and livestock production without an RMS on habitats for ESA-listed salmon and steelhead are described below. However, Quality Criteria for the RMS set forth in this Opinion are intended to avoid or minimize those effects by ensuring recovery of stream channels, floodplain connections, functional riparian zones, stable streambanks, acceptable water appearance and quality, removal of barriers to fish movements, development of pools and instream cover, suitable invertebrate habitat and invertebrate community structure. Further, each CP included in these RMS will be individually reviewed to ensure that it is designed, constructed, operated, and maintained as necessary to conserve aquatic habitats. This contributes to the goal of salmon and steelhead conservation by limiting in-water work to times when the fewest numbers of ESA-listed salmon and steelhead are expected to be present, ensuring fish passage around construction areas, and requiring best management practices related to conservation of native materials, heavy equipment use, stream crossings, streambank protection, and other management practices ancillary to the crop and livestock production process.

Vegetation composition and quantity and the width of the riparian area are influenced by land use. Cropping within riparian areas eliminates native vegetation establishment, while livestock presence within riparian areas has been demonstrated to alter vegetation types and quantities, decrease bank stability, increase stream temperatures, nutrient levels within streams, and alter instream biota (Spence *et al.* 1996). The historic replacement of natural site potential riparian vegetation with annual crops frequently results in large areas of repeatedly tilled soil that become increasingly compacted by machinery and are only covered with vegetation for part of the year. Commonly, little or no riparian vegetation is retained along streams as producers attempt to maximize acreage in crop or animal production. Continued cropping or animal presence to the edge of streams can decrease bank stability because deep rooted riparian vegetation is lost and/or inhibited from growth; sloughing of streambanks is a common occurrence in riparian zones in response to vegetation loss.

Riparian vegetation quantity and composition within cropped areas is influenced by the extent producers till and plant for crops, as well as upland hydrology, runoff and erosion rates. Typical crops have shallow roots, and do not provide functional shade to streams. Further, when crops are removed after the growing season, higher overland and instream flows cause erosion because there is little root structure in riparian zones to retain soils. As previously discussed, upland hydrological changes often result in increased water and sediment yields to streams. Without site potential native vegetation, riparian banks can erode away, decreasing topsoil quantity and quality (Spence *et al.* 1996).

The effects of livestock grazing on vegetation are especially intense in the riparian zone because of the tendency for livestock to congregate in these areas. Gillen *et al.* (1984) found that 24-47 percent of cattle in two pastures in north-central Oregon were observed in riparian meadows occupying only 3 to 5% of the total land area. Roath and Krueger (1982) reported that riparian meadows that are only 1 to 2% of the total land area accounted for 81% of the total herbaceous biomass removed by livestock. Similar preferences for riparian areas have been observed elsewhere in the west (reviewed in Kauffman and Krueger 1984; Fleischner 1994). Cattle and sheep typically select riparian areas because they offer water, shade, cooler temperatures, and an abundance of high quality food that typically remains green longer than in upland areas (Kauffman and Krueger 1984; Fleischner 1994; Heady and Child 1994). In mountainous terrain, the preference of cattle and sheep for the riparian zone also appears related to hillslope gradient (Gillen *et al.* 1984). Heady and Child (1994) suggest that cattle avoid slopes greater than 10 to 20%. The intensity of use by livestock in riparian zones exacerbates all of the problems noted above and generates additional concerns.

These circumstances often contribute to adverse geomorphic effects that induce widening and incision of stream channels, and compromise habitat functions necessary for MCR Steelhead. Loss of riparian vegetation from livestock grazing generally leads to stream channels that are wider and shallower than those in ungrazed or properly grazed streams. Loss of riparian root structure promotes greater instability of streambanks and reduces the formation of undercut banks that provide important cover for salmonids (Henjum *et al.* 1994). Furthermore, increased deposition of fine sediments from bank sloughing may clog substrate interstices and reduce both invertebrate production and the quality of spawning gravels. Over the long-term, reductions in instream wood diminish the retention of spawning gravels and decrease the frequency of pool habitats. In addition, the lack of structural complexity allows greater scouring of streambeds during high-flow events, thus reducing gravels available for spawning and cause channel downcutting. Where banks are denuded, undercutting and sloughing occurs, increasing sediment loads, filling stream channels, changing pool-riffle ratios, and increasing channel width (Platts 1981 in Fleischner 1994). Studies in eastern Oregon and northern California implicate livestock as a major cause of downcutting (Dietrich *et al.* 1993; Peacock 1994). Prolonged presence of livestock in the riparian zone increases sediment transport rates by increasing both surface erosion and mass wasting (Platts 1991; Marcus *et al.* 1990; Heady and Child 1994) while annual crop production within the riparian areas has similar effects. Reduced stability of streambanks associated with loss of riparian vegetation can lead to lateral vertical stream instability during periods of high runoff. Downcutting effectively separates the stream channel from the floodplain, allowing flood waters to be quickly routed out of the system and leading to lowering of the water table (Platts 1991; Elmore 1992; Armour *et al.* 1994). Consequently, summer stream flows may decrease although total water yield increases in response to vegetation removal (Elmore and Beschta 1987). Li *et al.* (1994) found that streamflow in a heavily grazed eastern Oregon stream became intermittent during the summer, while a nearby, well-vegetated reference stream in a similar-sized watershed had permanent flows. They suggested that the difference in flow regimes was a consequence of diminished interaction between the stream and floodplain with resultant lowering of the water table.

Loss of riparian vegetation, incision and widening of stream channels can influence instream temperatures. Li (1994) noted that solar radiation reaching the channel of an unshaded stream in the John Day River Basin was six times greater than that reaching an adjacent, well-shaded stream and that summer temperatures were 4.5°C warmer in the unshaded tributary. Below the confluence of these two streams, reaches that were unshaded were significantly warmer than shaded reaches both upstream and downstream. A separate comparison of water temperatures at two sites of similar elevation in watersheds of comparable size found temperature differences of 11°C between shaded and unshaded streams (Li 1994). Warming of streams from loss of riparian vegetation is likely widespread in the Tri-County region and may be particularly acute because of low summer flows and many cloud-free days. Streams channels that have been widened expose a larger surface area to incoming solar radiation (Bottom *et al.* 1984; Platts 1991). Wide, shallow streams heat more rapidly than narrow, deep streams (Brown 1980). Similarly, wide, shallow streams may cool more rapidly, increasing the likelihood of anchor ice formation. Reducing stream depth may expose the stream bottom to direct solar radiation and allow greater heating of the substrate with subsequent conductive transfer to the water. Removal or prevention of riparian vegetation growth can fundamentally alter the primary source of energy in streams. Reduction in riparian canopy increases solar radiation and temperature, and thus stimulates production of periphyton (Lyford and Gregory 1975). In a study of seven stream reaches in eastern Oregon, Tait *et al.* (1994) reported that thick growths of filamentous algae encrusted with epiphytic diatoms were found in reaches with high incident solar radiation, whereas low amounts of epilithic diatoms and blue-green algae dominated in shaded reaches. Periphyton biomass was significantly correlated with incident solar radiation.

While densities of macroinvertebrates in forested streams typically increase in response to increased periphyton production, the effect of stimulated algal growth in rangeland streams is less clear. Tait *et al.* (1994) found that biomass, but not density, of macroinvertebrates was greater in reaches with greater periphyton biomass. The higher biomass was a consequence of many *Dicosmoecus* larvae, a large-cased caddisfly, that can exploit filamentous algae. Consequently, any potential benefits of increased invertebrate biomass to organisms at higher trophic levels, including salmonids, may be small, because these larvae are well protected from fish predation by their cases. Tait *et al.* (1994) suggest that these organisms may act as a trophic shunt that prevents energy from being transferred to higher trophic levels.

Livestock and cropping activities can directly affect nutrient dynamics through several mechanisms. The removal of riparian vegetation by grazing or cropping near streams reduces the supply of nutrients provided by organic leaf litter. Livestock also redistribute nutrients across the landscape. Because riparian areas are favored by cattle and sheep, nutrients eaten elsewhere on the range are often deposited in riparian zones or near other attractions, such as salt blocks (Heady and Child 1994). The deposition of nutrients from animals or the application of nutrients/fertilizers increases the likelihood that elements such as nitrogen and phosphorous will enter the stream. Nutrients derived from livestock wastes may be more bioavailable than those bound in organic litter. Excess nutrients from cropping activities from upland sources and near streams can be delivered to streams as well, underscoring the importance of appropriate setbacks and application at agronomic rates, *i.e.*, a rate equal the anticipated biological uptake of the plants that reduces the opportunity for nutrient runoff.

As stream channels incise and streams are separated from their floodplains, soil moisture is reduced, and the quantity and form of nutrients and their availability to aquatic communities is changed. In the anaerobic environments of saturated soils, microbial activity transforms nitrate nitrogen (NO_3) into gaseous nitrous oxide (N_2O) and elemental nitrogen (N_2) liberated to the atmosphere (Green and Kauffman 1989). Under drier soil conditions (oxidizing environments), denitrification does not occur and nitrate-nitrogen concentrations in the soil increase. Because nitrate is negatively charged, it is readily transported by subsurface flow to the stream channel (Green and Kauffman 1989). Thus, by altering the hydrologic conditions in the riparian zone, grazing can increase how much nitrate nitrogen is released to streams. Excessive nitrate concentrations encourage algal growth, increase turbidity, and may cause oxygen depletion because of increased biochemical oxygen demand.

The form of other elements including manganese, iron, sulfur, and carbon also depends on the redox potential of soils. In their reduced form, manganese, iron, and sulfur are toxic to plants at high concentrations (Green and Kauffman 1989). Obligate and facultative wetland plant species have special adaptations for coping with these reduced elements that allow them to survive where more xeric plants cannot. Thus, changes in hydrologic condition caused by downcutting can modify the form of elements available to plants, altering competitive interactions between plants and changing riparian plant communities.

The primary activity within Streambank and Shoreline Protection (CP580) is the use of large wood and vegetation to increase bank strength and resistance to erosion in an ecological approach to engineering streambank protection (Mitsch 1996; WDFW *et al.* 2003). Construction of 'hard' scour protection for specific public infrastructure and construction of barbs to redirect flow are also proposed. The proposed actions explicitly do not include any other type of structure built entirely of rock, concrete, steel or similar materials, other streamflow control structures, or any type of channel-spanning structure. Except as noted below, most direct and indirect effects of proposed streambank protection actions are the same as those for sediment mobilization discussed above. The primary means of streambank protection proposed is the use of large wood and vegetation to increase resistance to bank erosion (bioengineering). This approach protects banks by using natural materials to increase erosion resistance and bank roughness to disrupt stream energy. Roots and other small and large pieces of vegetation are used to collect and bind bank sediments. This helps to avoid or minimize loss of riparian function associated with more traditional approaches to streambank protection that rely primarily on rock, cement, steel and other hard materials. Bioengineered bank treatments develop root systems that are flexible and regenerative, and respond more favorably to hydraulic disturbance than conventional hard alternatives. Besides conservation measures listed above, the effects of streambank protection will be further minimized or avoided by ensuring that all streambank protection actions will provide the greatest degree of natural stream and floodplain function achievable through application of an integrated, ecological approach by requiring the selection of protection measures to be constrained by an analysis of the mechanisms and causes of streambank failure, reach conditions, and other adverse affects to habitat conditions. In addition, large wood will be included as an integral component of all streambank protection treatments. The wood will be intact, hard, and undecayed to partly decaying with untrimmed root wads to provide functional refugia habitat for fish.

Proposed streambank protection actions also include construction of a barb to redirect low flows believed to be causing certain kinds of bank erosion. A barb is a low elevation projection from a bank that is built primarily of stone and angled upstream to redirect flow away from the bank and control flow alignment. The direct effects of a barb also include redirection of instream flow away from the bank and toward the thalweg. This is believed to improve bank stability along smoothed channel or bends, especially when used in combination with bioengineering techniques (WDFW *et al.* 2000). This combination is most effective for reducing bank erosion along the outer edge of the channel migration zone in reaches where sedimentation and flows remain relatively constant over time. Barbs are designed to be overtopped by channel forming flows. This ensures that any direct effect they may have on channel forming processes or floodplain connectivity are avoided or minimized. Besides conservation measures listed above, the direct effects of barbs will be further minimized or avoided by the following conservation measures: (1) Woody riparian planting will be included as part of every streambank protection action; (2) no part of the barb structure may exceed bank full elevation, including all rock buried in the bank key; (3) the trench excavated for the bank key above bankfull elevation will be filled with soil and topped with native vegetation; (4) the barb itself will incorporate large wood; (5) maximum barb length will not exceed 1/4 of the bankfull channel width; (6) rock will be individually placed without end dumping; and (7) if two or more barbs are built in a series, the barb farthest upstream will be placed within 150-feet or 2.5 bankfull channel widths, whichever is less, from the barb farthest downstream.

The Stream Improvement functional group restoration actions are limited to removal of trash, other artificial debris, sediment bars or terraces that block fish passage; removal of water control structures; and setback of levees, dikes and berms; placement of large woody debris, and reshaping of streambanks as necessary to reestablish vegetation. Most direct and indirect effects of stream and wetland restoration actions are the same as those for general construction discussed above, and stream and wetland restoration actions will follow the conservation measures for general construction as applicable. Further direct physical and chemical effects of trash and debris removal can include resuspension and deposition of sediment and contaminants contained in or buried under the trash and debris. Land use practices such as agriculture and urban development have contributed increased sediment in streams. Sometimes this sediment can accumulate at the stream mouth, forming a bar or terrace. The bar or terrace can spread the streamflow into finely braided or sheet flow patterns, forming temporal or complete passage barriers to fish. While removal of sediment bars that block fish passage would normally be beneficial to anadromous fish in the long term, excessive amounts of removal may lead to ancillary effects to stream bed and banks that impair habitat formation and stream processes. Additional analyses of the project are necessary to evaluate these effects. Therefore, limits on the amount and location of sediment bar and terrace removal are required.

Additional direct physical and chemical effects of removing water control structures and setting back levees, dikes and berms include an increase in effective floodplain and wetland area by restoration of seasonal flow. Additional biological effects of removing fish passage obstructions and removing or setting back water control structures can include an increase in the total habitat area available, and fish stranding. In addition to conservation measures listed above, the NRCS proposed the following conservation measure to further minimize or avoid these effects: (1) Removal of sediment bars or terraces to improve fish passage is limited to areas within 50-feet of the mouth of a tributary, and to 25 cubic yards or less of sediment, and (2) adequate precautions will be taken to prevent post-construction stranding of juvenile or adult fish.

Most indirect effects of removing water control structures and setting back levees, dikes and berms are similar to those discussed above for general construction. However, these actions can also alter environmental conditions in the project area such that it is converted from an upland biological community and ecosystem to a riparian, wetland or aquatic community and ecosystem. Many complex changes in soil, vegetation and hydrological conditions accompany this conversion and are beneficial for the restoration of proper functioning habitat conditions for salmon and steelhead (NRC 1992; Williams *et al.* 1996).

The preservation and/or recovery of riparian areas and instream habitat within the Range and Pastureland RMS will rely on CPs in the Livestock Management functional group. These practices influence vegetation establishment in riparian areas through the exclusion or limitation of animal use within riparian and aquatic habitats, and/or providing non-stream water sources that protect natural site potential vegetation from animal damage and encourage the deposition of nutrients (manure) away from riparian and aquatic habitats. Animals Trails and Walkways (CP575) can have particular influence over the degree of animal access to waterways. In some settings, animals must traverse streams to reach grazing land. Provided that animal access for crossings is limited to areas that do not have incubating eggs, and animals are not allowed to linger in streams, the Animal Trails and Walkways practice can minimize adverse affects to stream biota.

While these practices are used to move animals away from riparian areas, they inevitably result in the consumptive use of water that would otherwise contribute to stream base flows. Cows typically drink about 16 gallons a day and a 500 cow herd drinks about 8,000 gallons a day. In this herd size scenario, consumptive use converts to 0.01 cubic feet per second (cfs). The latest Census of Agriculture counted about 57,000 cows and calves in all of Wasco, Sherman and Gilliam Counties combined (USDA and NASS 1997). With the conservative assumption that calves drink as much as adult cows, the total consumptive use of water within the Tri -County Region area results in about 1.1 cfs worth of water per day. While the proposed action minimizes the loss of water from off-channel delivery systems, no delivery system is 100% efficient. Assuming a 50% efficiency rate, to account for water lost during conveyance, the total consumptive use from cows and their delivery systems would be approximately 1.7 cfs per day. Although it is anticipated that not all of the Tri-County Region herd will have appropriate RMS plans within the time-frame of this consultation, this volume of water loss from instream flows spread amongst the Deschutes and John Day watersheds would not result in measurable adverse affects for MCR steelhead.

The selection and implementation of the CPs within each RMS system are tailored to the effected streams from riparian and upland baseline conditions. The host of observed effects as detailed above indicate a robust application of CPs to meet salmon quality criteria will be identified within the RMS. Functional riparian vegetation stabilizes streambanks, slows the flow of water during high flow events, and allows waters to spread out over the floodplain and recharge subsurface aquifers (Elmore 1992). Riparian areas play a major role in regulating the transportation and transformation of nutrients and other chemicals, especially those with a diverse assemblage of site potential native vegetation. Moreover, riparian vegetation facilitates sediment deposition and bank building, increasing the capacity of the floodplain to store water, that is then slowly released as baseflow during the drier seasons (Elmore and Beschta 1987). Riparian vegetation shades streams and regulates stream temperatures. On rangelands east of the Cascades, black cottonwood, mountain alder and quaking aspen are the dominant deciduous tree species in natural communities (Kauffman 1988). Shrubby vegetation, such as willows, may also be an important source of shade along smaller streams and in mountainous areas (Henjum *et al.* 1994).

The structure and function of riparian areas within each RMS type will determined primarily by conservation practices in the Stream Improvement and Conservation Buffer functional groups, especially the riparian buffer practices. This suite of CPs will be used to restore the vegetative communities of streambanks, in turn facilitating the incremental yet essential enhancement of functions necessary for MCR steelhead survival and recovery.

2.1.3.2 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." Other activities within the watershed have the potential to harm fish and aquatic habitats within the action area. Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being (or have been) reviewed through separate section 7 consultation processes.

The number of people living in the Tri-County area may be declining slightly due to losses in agricultural areas that are only partly offset by expanding urban centers. Concerns about the sustainability of crop and livestock production are leading to adoption of innovative agricultural systems. To the extent that land managers voluntarily use salmon quality criteria and indicators described in this Opinion, as applicable, or their equivalents, to guide management of agricultural lands upslope of the action area, the cumulative effects are likely to be wholly beneficial for listed species by reducing disturbance associated with episodic storms, thus providing an extra margin of protection to the buffering capacity and habitat functions of the riparian and aquatic area. Together, these trends may lead to improvements in the environmental baseline.

2.1.3.3 Effects to Critical Habitat

NOAA Fisheries designates critical habitats based on physical and biological features that are essential to the listed species. The essential elements of a designated critical habitat are substrate, water quality, water quantity, water temperature, food, riparian vegetation, access, water velocity, space and safe passage. Critical habitat is only designated in the action area in mainstem of the Columbia River, and for Snake River stocks only. NOAA Fisheries anticipates that turbidity caused by sediment release from actions necessary to complete the proposed RMS will be the only effect of this action on these critical habitats. Further, use of sediment and erosion control measures included as part of the proposed RMS will minimize the potential for sediment release. This will ensure that any possible increase in the turbidity of mainstem critical habitats will be minor, local, and temporary, and therefore not sufficient to reduce the capacity of those critical habitats to support juvenile or adult members of any Snake River ESU.

2.1.3.4 Consistency with Basinwide Salmon Recovery Strategy

Step 4 of the evaluation framework ultimately requires that NOAA Fisheries determine whether the species-level biological requirements can be met considering the significance of the effects of the action under consultation. Recovery planning can provide the best guidance for making this determination. Recovery planning will identify the feasible measures that are needed in each stage of the salmonid life cycle for conservation and survival within a reasonable time. Measures are feasible if they are expected both to be implemented and to result in the required biological benefit. A time period for recovery is reasonable depending on the time requirements for implementation of the measures and the confidence in the survival of the species while the plan is implemented. The plan must demonstrate the feasibility of its measures, the reasonableness of its time requirements, and how the elements are likely to achieve the conservation and survival of the ESA-listed salmon and steelhead based on the best science available.

In 1995, NOAA Fisheries relied on the proposed Snake River salmon recovery plan, issued in draft in March 1995 (NMFS 1995). Since 1995, the number of ESA-listed salmonid species and the need for recovery planning for Columbia Basin salmonids has quadrupled. Rather than finalize the 1995 proposed recovery plan, NOAA Fisheries has developed guidelines for basin-level, multi species recovery planning that will provide the basis for individual, species-specific recovery plans. "Basin-level" encompasses habitat, harvest, hatcheries, and hydro. This recovery planning analysis is contained in the document entitled "Conservation of Columbia Basin Fish: Final Basinwide Salmon Recovery Strategy" (Basinwide Recovery Strategy)(Federal Caucus 2000).

The Basinwide Recovery Strategy replaces the 1995 proposed recovery plan for Snake River stocks until a specific plan for those stocks is developed on the basis of the Basinwide Recovery Strategy. Recovery plans for each individually listed species will provide the particular statutorily required elements of recovery goals, criteria, management actions, and time estimates that are not developed in the Basinwide Recovery Strategy. In the interim, the Basinwide Recovery Strategy identifies immediate actions to prevent extinction and foster recovery by improving survival across all life stages. It emphasizes actions that are currently authorized, that have predictable benefits, and that benefit a broad range of species.

The Basinwide Recovery Strategy recommends conservation actions to address each factor for decline within the Basin, and actions to restore tributary habitats are among the foremost for immediate application. The following items were identified as "fast start" actions to restore tributary habitats in all basins:

- Development of subbasin assessments and plans.
- Assurance that those assessments and plans are coordinated across non-federal and Federal ownerships and programs.
- Fixing flow, screening and passage problems.
- Providing protection for riparian areas in agricultural areas by supplementing agricultural incentive programs.
- Expanding agricultural incentive programs.

Better control of non-point pollution from agricultural runoff, improved animal management in shoreline areas, planting riparian buffers and restoring wetlands on streams that provide habitat for ESA-listed salmon and steelhead, and reduced pesticide and fertilizer use are also identified as specific conservation needs in agricultural lands.

Other ways to conserve fish habitats on non-federal lands generally include protecting habitats that are currently productive, especially if at risk of being degraded. These habitats should be protected through conservation easements, acquisitions or other means, so they can serve as anchor points for restoration. Restoring degraded habitats is of lower priority. Undertaking difficult and expensive efforts to restore degraded habitats while losing existing productive habitats would be a poor bargain. Non-governmental participation in locally-led watershed planning and implementation organizations, backed by technical expertise from local, state, tribal, and Federal agencies is critical to the success of these actions so that local economic, social and environmental concerns are met along with broader habitat and watershed restoration objectives. For Federal investments in resource conservation on private lands to reach their full potential, strong working partnerships will be needed with state salmon and watershed recovery programs, other Federal agencies, and non-federal landowners.

Fish productivity is the ultimate performance standard for achievement of habitat improvement but is not measurable in the short term. Instead, the Basinwide Recovery Strategy calls for development of a set of performance measures based on associations between ecosystem processes and salmonid populations to create a more immediate gauge of conservation success. Increased stream miles meeting water quality standards, increased stream miles with adequate instream flows, increased stream miles opened to fish access, increased number of diversions screened, and increased acres and/or stream miles of habitat protected or restored are the habitat factors to be included as habitat performance standards. The Federal Caucus agencies anticipate that accomplishing action described in the habitat element of the Basinwide Recovery Strategy will have significant measurable benefits for ESA-listed salmon and steelhead, and resident fish, including increased cumulative survival and lowered risk of extinction. Thus, actions that are consistent with those called for in the Basinwide Recovery Strategy are also consistent with the Strategy's primary goal of increasing the likelihood of conservation of ESA-listed salmon and steelhead.

While the species-specific recovery plans are being developed, the Basinwide Recovery Strategy provides the best guidance for judging the significance of an individual action relative to the species-level biological requirements. In the absence of completed recovery planning, NOAA Fisheries strives to ascribe the appropriate significance to actions to the extent available information allows. Where information is not available on the recovery needs of the species, either through recovery planning or otherwise, NOAA Fisheries applies a conservative substitute that is likely to exceed what would be expected of an action if information were available. The proposed action is consistent with the primary objectives of the Basinwide Recovery Strategy for conservation of tributary habitats. Use of the proposed RMS and constituent CPs based on voluntary, incentive-based approaches operating within a regulatory context of restoration criteria and performance standards will make an important contribution toward the conservation of tributary habitat necessary to recover ESA-listed salmon and steelhead while minimizing adverse socioeconomic and other human effects.

2.1.4 Conclusion

After reviewing the best available scientific and commercial information regarding the current status of the 12 ESUs considered in this Opinion, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NOAA Fisheries' opinion, that the action, as proposed, is not likely to jeopardize the continued existence of these species, and is not likely to destroy or adversely modify designated critical habitat.

These conclusions are based on the following considerations: (1) The NRCS will review each farm and ranch plan developed using the Dry Cropland and Range and Pastureland Resource Management Systems in the Tri-County area to ensure that all conservation practices and management actions the NRCS deems necessary to meet or exceed the salmon quality criteria and indicators are included; (2) to the extent that the NRCS has discretion and control over completion of the conservation plans, it will ensure that all actions called for by the plan are funded and carried out with conservation measures necessary to avoid and minimize incidental take; (3) to the extent that the NRCS may not have authority to direct how some details of the plans will be completed, it will nonetheless specify that it is the cooperator's responsibility to comply voluntarily with specified conservation measures for the exemption from the take prohibition in the incidental take statement to apply; (4) actions by the NRCS and its cooperators that are consistent with a conservation plan prepared using the salmon quality criteria are likely to result in significant, long-term improvement to riparian and aquatic habitat conditions across the action area; and (5) to the extent that cooperators voluntarily use salmon quality criteria and indicators (as applicable) to apply conservation practices to fields and pastures in upland areas, the effects are likely to be wholly beneficial for listed species and provide an extra margin of protection to the buffering capacity and habitat functions of the riparian and aquatic area. Therefore, the effects of this action are not expected to impair currently properly functioning habitats, appreciably reduce the functioning of already impaired habitats, or retard the long-term progress of impaired habitats toward proper functioning condition essential to the long-term survival and recovery at the population or ESU scale.

2.1.5 Conservation Recommendations

Conservation recommendations are defined as "discretionary measures to minimize or avoid adverse effects of a proposed action on ESA-listed salmon and steelhead or critical habitat or regarding the development of information" (50 CFR 402.02). Section 7 (a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. NOAA Fisheries believes the conservation recommendations listed below are consistent with these obligations, and therefore should be implemented by the NRCS.

1. To the greatest extent possible, the NRCS should use the salmon quality criteria and indicators developed during this consultation to prepare RMS for irrigated cropland, fruit production, hay production, wildlife lands, and other agricultural production systems that may be used in the action area but were not the subject of this consultation.

2. The NRCS should develop a plan to adapt and integrate salmon quality criteria and indicators for other agricultural production systems in Oregon that are also within the range of ESA-listed salmon and steelhead.

3. The NRCS should encourage the Farm Service Agency to increase the flexibility of buffer width guidelines used as part of the Oregon Conservation Reserve Enhancement Program (CREP), and encourage landowners to use CREP and similar cost share programs to protect riparian areas on farms and ranches. NOAA Fisheries believes that the NRCS should routinely seek maximum riparian buffer widths, possibly tied to floodplain boundaries, as part of each cost share project to promote development of fully formed and functional riparian areas, especially when payments would likely equal or exceed net farm or ranch profits obtainable from the land.

4. The NRCS should encourage systematic deployment, protection and management of the full range of conservation buffer practices across the agricultural landscape to ensure that overall aquatic habitat improvements are appreciable. Application of production practices that reduce pollutants at their source in the field or pasture is a first step. However, production practices by themselves cannot fully address off-field and out-of-pasture pollutant delivery and other landscape-level concerns. Landscape level buffers are an extension of better production systems. Both are necessary to provide cost-effective protection against the cumulative effects of many small but unavoidable pollutant discharges associated with an active agricultural enterprise and the kinds of catastrophic pollution that can be associated with the high energy and runoff associated with episodic storms. Whenever possible, buffer practices should be linked across land ownership boundaries to support populations within the watershed. This is particularly important with stream restoration efforts. Further, it must be recognized that the riparian forest buffer is the only practice that can provide the shading, large wood production, organic matter input, and other intrinsic habitat functions essential to salmon and steelhead conservation in streams occupied by those species during a variety of life stages.

5. In the Columbia Basin, the NRCS should participate in the Northwest Power and Conservation Council process for subbasin assessment and planning. This will: (1) Help the NRCS better understand how its programs fit with ESA recovery planning, (2) provide a useful framework for coordinating and leveraging actions of the NRCS with actions of others who are funding or carrying out recovery actions, and (3) help target areas and actions that are the highest priority for improving ESA-listed salmon and steelhead survival. NOAA Fisheries expects to use the Council's subbasin plans which credibly address listed salmonids, and ESA recovery goals and key recovery strategies now emerging from the Interior Columbia and Willamette/Lower Columbia Technical Recovery Teams, as building blocks for the habitat and production components of ESA recovery plans.

For NOAA Fisheries to be kept informed of actions minimizing or avoiding adverse effects, or those that benefit ESA-listed salmon and steelhead or their habitats, NOAA Fisheries requests notification of the achievement of any conservation recommendations when the NRCS submits its annual report describing RMS implementation and effectiveness monitoring activities during the previous year.

2.1.6 Reinitiation of Consultation

Consultation must be reinitiated if: (1) The amount or extent of taking specified in the incidental take statement is exceeded, or is expected to be exceeded; (2) new information reveals effects of the action may affect ESA-listed salmon and steelhead in a way not previously considered; (3) the action is modified in a way that causes an effect on ESA-listed salmon and steelhead that was not previously considered; or (4) a new species is listed or critical habitat is designated that may be affected by the action (50 CFR. 402.16).

If the NRCS fails to provide specified monitoring information by the required date, NOAA Fisheries may consider that a modification of the action that causes an effect on ESA-listed salmon and steelhead not previously considered and causes the incidental take statement of the Opinion to expire. Consultation also must be reinitiated five years after the date this Opinion is signed. To reinitiate consultation, contact the Habitat Conservation Division (Oregon State Habitat Office) of NOAA Fisheries.

2.2 Incidental Take Statement

Section 9(a)(1) and protective regulations adopted pursuant to section 4(d) of the ESA prohibit the taking of ESA-listed species without a specific permit or exemption. Among other things, actions that harass, injure, or kill individuals of an ESA-listed species, or alters habitat in a way that significantly impairs essential behavioral patterns of that species, may result in a taking. As described below, section 7(o)(2) exempts any taking that meets the terms and conditions of a written incidental take statement from the taking prohibition. Partial compliance with these terms and conditions may invalidate the take exemption, and may lead NOAA Fisheries to a different conclusion whether the proposed action is likely to jeopardize the continued existence of ESA-listed species, or to adversely modify or destroy critical habitat.

2.2.1 Amount or Extent of Take

NOAA Fisheries expects that development and completion of RMS for Dry Cropland and Range and Pastureland in the Tri-County Region are reasonably certain to cause incidental take of ESA-listed salmon and steelhead considered in this Opinion. The incidental take will be caused by the direct physical and chemical effects of machinery and personnel working as necessary to construct, operate and maintain conservation practices specified in the RMS, and the indirect effects associated with active farm and ranch operations consistent with completion of an approved RMS. A very small proportion of the juvenile MCR steelhead in the Tri-County area are likely to be harassed, injured, or killed by in-water work during construction of conservation practices, or harmed by the temporary loss of riparian and aquatic habitat features during the operation and maintenance of those practices. Incidental take will also include an even smaller number of individuals from other ESUs that are likely to be harmed by temporary increases in turbidity of the mainstem Columbia River.

The potential adverse effects of these actions on populations of ESA-listed salmon and steelhead are largely unquantifiable, and NOAA Fisheries expects them to be far too small to be measurable as long-term effects on populations. Therefore, although NOAA Fisheries expects a low level of incidental take to occur due to harm caused by this action, the best scientific and commercial data available are not sufficient to enable NOAA Fisheries to estimate a specific amount of incidental take. In instances such as these, NOAA Fisheries designates the expected level of take as "unquantifiable." The extent of the incidental take is limited to that occurring due to construction, operation and maintenance of conservation practices installed within 328-feet (100 meters) of wetlands and on either side of perennial or seasonal streams that (1) are within the present or historic range of an ESA-listed species, or (2) are within 0.5 miles upstream of that range and physically connected to it by an above-ground channel that will deliver water, sediment, or woody material to an area occupied by ESA-listed species. The extent of take also includes riparian and aquatic features up to 0.5 miles downstream of the areas.

2.2.2 Reasonable and Prudent Measures

Reasonable and Prudent Measures are non-discretionary measures to minimize take that must be carried out by cooperators for the exemption in section 7(o)(2) to apply. The NRCS has the continuing duty to regulate the activities covered in this incidental take statement where discretionary Federal involvement or control over the action has been retained or is authorized by law. The protective coverage of section 7(o)(2) may lapse if the NRCS fails to exercise its discretion to require cooperator adherence to terms and conditions of the incidental take statement through enforceable terms added to the RMS plan or grant document, or to exercise that discretion as necessary to retain the oversight to ensure compliance with these terms and conditions. Similarly, if cooperators fail to act in accordance with the terms and conditions of the incidental take statement, protective coverage may lapse. The NOAA Fisheries believes that activities carried out in a manner consistent with these reasonable and prudent measures , except those otherwise identified, will not require further site-specific consultation. Activities that do not comply with all relevant reasonable and prudent measures will require further consultation.

The NOAA Fisheries believes that the following reasonable and prudent measures are necessary and appropriate to minimize take of listed fish resulting from implementation of the action. These reasonable and prudent measures would also minimize adverse effects to designated critical habitat.

The NRCS shall:

1. Avoid or minimize incidental take by preparing farm and ranch conservation plans in the Tri-County Region that use salmon quality criteria and indicators to specify treatment levels necessary to conserve ESA-listed salmon and steelhead.

2. Avoid or minimize incidental take by specifying that each conservation practice included as part of a farm or ranch conservation plan will be designed, constructed, operated, and maintained as necessary to ensure that adverse effects to riparian and aquatic habitats will be brief, minor, and scheduled to occur at times that are least sensitive to the species life-cycle

3. Complete a comprehensive monitoring and reporting program to confirm this Opinion is meeting its objective of avoiding and minimizing take from permitted activities.

2.2.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the NRCS and its cooperators must comply with the following terms and conditions, that implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary and, in relevant part, apply equally to each farm and ranch conservation plan and conservation practice designed, selected, or carried out as part of the proposed action.

1. To implement reasonable and prudent measure #1 (use of the salmon quality criteria and indicators); the NRCS shall ensure that:

    a. Individual conservation plan review. Each conservation plan is individually reviewed to confirm the following conditions are met.

        i. Confirmation of action area. Confirm that each planning area is within the action area for this consultation. The action area includes all fields and pastures affected by completion of the subject RMS and (1) are also within the present or historic range of an ESA-listed species; (2) are within designated critical habitat; or, (3) are within 0.5 miles upstream of such areas and beside any perennial or seasonal waterway that is physically connected by an above ground channel system such that water, sediment, or woody material delivered to that waterway will eventually be delivered to a stream occupied by an ESA-listed species. The action area also includes riparian and aquatic areas 100-feet upstream and 0.5 miles downstream of those fields and pastures. If necessary, contact a fish biologist from the NRCS, NOAA Fisheries, or ODFW to confirm this.

        ii. Use of salmon quality criteria. Treatment level necessary to address salmon conservation concerns are identified and selected using the salmon quality criteria and indicators found below in section 1(a)(v).

        iii. Adverse effects analysis. All direct and indirect adverse effects that actions specified in the conservation plan will have on ESA-listed salmon and steelhead and their habitats are within the range of effects considered in this Opinion.

        iv. Unauthorized actions requiring individual consultation. The following actions are not authorized by this Opinion.

            (1) Any practice that will restrain the free passage, upstream and downstream, of adult and juvenile salmon and steelhead.

            (2) Use of treated wood[5] below bankfull elevation where it will contact flowing water, or be exposed to precipitation or mechanical abrasion.

            (3) Pesticide applications.

            (4) Streambank stabilization methods not explicitly authorized by this consultation.

[5] 'Treated wood' means lumber, pilings, or other wood products that are treated or preserved with pesticidal compounds including, but not limited to, alkaline copper quaternary, ammoniacal copper arsenate, ammoniacal copper zinc arsenate, copper boron azole, chromated copper arsenate, copper naphthenate, creosote, and pentachlorophenol.

(5) Construction of new or upgraded water control structures[6] in perennial stream channels or fish-bearing waters.
(6) Construction of new, permanent roads within 150-feet of perennial streams, 100-feet of intermittent streams, or 50-feet of ephemeral waterways with appropriate spawning substrates..
(7) Any new water diversion or water use, except for off-channel livestock watering.
(8) Any other component of a conservation practice that the NRCS determines may prevent or delay achievement of the salmon quality criteria.

v. Salmon quality criteria. The following criteria apply to perennial streams, intermittent streams, and ephemeral waterways with appropriate spawning substrates.

(1) Target: The following minimum indicator scores, with a static or upward trend, will be achieved for each indicator within each evaluation stream reach.
(a) Attach an ecological rationale to the conservation plan for any indicator that is below the minimum score, or has a declining trend.
(b) If individual cooperator actions cannot solve an existing conservation problem following these criteria, group planning will be encouraged and the criteria will be met if the client is not contributing to the problem.

(2) Indicators: The following indicators from the Stream Visual Assessment Protocol[7] will be evaluated for one or more stream reaches as necessary to represent the range of aquatic habitat conditions across the full planning area. The Benchmark Condition must meet these threshold scores or a RMS plan will be developed so that stream habitat, within the cooperator's control, will attain or exceed these threshold scores.
(a) Channel condition: Score of 7 or higher – Evidence of past channel alteration, but with significant recovery of channel and banks. Any dikes or levies are set back to provide access to an adequate floodplain.
(b) Hydrologic alteration: Score of 7 or higher – Flooding occurs only once every 3 to 5 years; limited channel

[6] 'Water control structure' means impoundments such as dams, dikes, levees, channelization of streams, grade control structures (weirs), bulkheads, revetments, and similar structures.

[7] U.S. Department of Agriculture, Natural Resources Conservation Service, National Water and Climate Center Technical Note 99-1, Stream Visual Assessment Protocol (December 1998) (available at http://www.nrcs.usda.gov/technical/streams.html).

incision. Withdrawals, although present, do not affect available habitat for biota.

(c) Riparian zone: Score of 10 – Natural vegetation extends at least two active channel widths on each side or, if less than two widths, covers entire floodplain[8] given the appropriate soils, slope and topography are present to support natural riparian vegetation.

(d) Bank stability: Score of 7 or higher – Moderately stable; banks are low (at elevation of active floodplain); more than 33% of eroding surface area of banks in outside bends is protected by roots that extend to the baseflow elevation.

(e) Water appearance: Score of 7 or higher – Occasionally cloudy, especially after storm event, but clears rapidly; objects visible at depth 1.5 to 3 ft; may have slightly green color; no oil sheen on water surface.

(f) Nutrient enrichment: Score of 7 or higher – Clear water along entire reach; diverse aquatic plant community includes low quantities of many species of macrophytes; little algal growth present.

(g) Barriers to fish movement: Score of 10 – No barriers to upstream or downstream movements of juvenile or adult life stages, seasonal water withdrawals do not inhibit movement within the reach.

(h) Instream fish cover: Score of 8 or higher – 6 to 7 cover types available.

(i) Pools: Score of 7 or higher – Pools present, but not abundant; from 10 to 30% of the pool bottom is obscure due to depth, or the pools are at least 3-feet deep.

(j) Invertebrate habitat: Score of 7 or higher – 3 to 4 types of habitat. Some potential habitat exists, such as overhanging trees, which will provide habitat, but have not yet entered the stream.

(k) Canopy cover: Score of 7 or higher – >50% shaded in reach. or >75% in reach, but upstream 2 to 3 miles poorly shaded.

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[8] This element is the width of the natural vegetation zone from the edge of the active channel of a stream occupied by an ESA-listed species, or within 0.5 miles upstream of any perennial or seasonal waterway that is physically connected to such a stream by an above ground channel system. The edge of the active channel may be identified using morphological features such average bank height, scour lines and vegetation limits, out onto the floodplain. 'Natural' means plant species native to the site and plant communities featuring all appropriate structural components and stages of regeneration, *e.g.*, aquatic plants, sedges, rushes, grasses, forbs, shrubs, understory and overstory trees that vary in age from seedling to mature. The riparian vegetation must occur on both sides of the stream, and must be protected with an adequate buffer to prevent any concentrated flows from entering. The quality of the riparian zone increases with the width and complexity of the woody vegetation within it.

(l) Riffle embeddedness: Score of 10 – Gravel or cobble particles are <20% embedded.

(m) Macroinvertebrates: Score of 10 or higher – Community dominated by Group I or intolerant species, such as stoneflies, caddisflies, and mayflies, although some Group II or facultative species may also be present, such as damselflies, dragonflies, blackflies, crayfish.

b. Each cooperator engaged in preparation of a conservation plan is informed of the following requirement:

> If a sick, injured or dead specimen of a threatened or endangered species is found, the finder must notify the Vancouver Field Office of NOAA Fisheries Law Enforcement at 360.418.4246. The finder must take care in handling of sick or injured specimens to ensure effective treatment, and in handling dead specimens to preserve biological material in the best possible condition for later analysis of cause of death. The finder also has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed unnecessarily.

2. To implement reasonable and prudent measure #2 (design, construction, operation, and maintenance of conservation practices necessary to complete a conservation plan), the NRCS shall specify that:

a. Individual conservation practice review. Each applicable term and condition from this Opinion will be included as a final specification in the conservation practice.

b. Salmon habitat conservation goal. The goal of salmon habitat conservation is renewal or maintenance of habitat access, water quality, production of habitat elements (*e.g.*, large woody debris), channel conditions, flows, watershed conditions and other ecosystem processes that form and maintain productive fish habitats.

c. Work area and timing. Work within the active channel will be completed during the ODFW preferred in-water work period,[9] as appropriate for the project area, unless otherwise approved in writing by NOAA Fisheries.

d. Fish passage. Provide passage for any adult or juvenile salmonid species present in the project area during construction, unless otherwise approved in writing by NOAA Fisheries.

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[9] Oregon Department of Fish and Wildlife, *Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources*, 12 pp (June 2000) (identifying work periods with the least adverse affect on fish) (http://www.dfw.state.or.us/ODFWhtml/InfoCntrHbt/0600_inwtrguide.pdf).

e. Native materials. If possible, leave native materials where they are found. Otherwise, stockpile large wood[10], native vegetation, native topsoil, and native channel material displaced by construction for use during site restoration.

f. Plant materials. Native species will be used for plantings wherever appropriate native stock are available in sufficient quantities and at a reasonable cost. If a good faith attempt to obtain native stock or seed is unsuccessful, similar species that are functional equivalents and known not to be aggressive colonizers may be substituted.

g. Vehicle and machinery staging. Vehicles will be fueled, operated, maintained and stored as follows.

   i. Vehicle staging, cleaning, maintenance, refueling, and fuel storage must take place in a vehicle staging area placed 150-feet or more from any stream, waterbody or wetland, unless terrain makes this infeasible. In those cases, suitable containment must be provided to prevent potential spills from entering any stream or waterbody.

   ii. All vehicles operated within 150-feet of any stream, waterbody or wetland must be inspected daily for fluid leaks before leaving the vehicle staging area. Any leaks detected must be repaired in the vehicle staging area before the vehicle resumes operation.

   iii. All equipment operated instream must be cleaned before beginning operations below the bankfull elevation to remove all external oil, grease, dirt, and mud.

h. Access roads and stream crossings. Existing access roads or trails and stream crossings will be used whenever possible, unless new construction would result in less habitat take and the old trail or crossing is retired. If a new way or stream crossing is required to accomplish actions described in a conservation plan, it will be constructed as follows.

   i. Access roads or trails will have a vegetative buffer that is adequate to avoid or minimize runoff of sediment and other pollutants to surface waters, and otherwise minimize disruption or riparian vegetation.

   ii. Minimize the number of stream crossings.

   iii. Do not place stream crossings where ESA-listed salmon or steelhead spawn or are suspected of spawning, or within 300-feet upstream if spawning areas may be disturbed.

   iv. Design and construct or improve essential crossings to handle reasonably foreseeable flood risks, including associated bedload and debris, and to prevent the diversion of streamflow out of the channel and down the trail if the crossing fails.

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[10] For purposes of this Opinion, 'large wood' means a tree, log, or rootwad big enough to dissipate stream energy associated with high flows, capture bedload, stabilize streambanks, influence channel characteristics, and otherwise support aquatic habitat function, given the slope and bankfull channel width of the stream in which the wood occurs. See, Oregon Department of Forestry and Oregon Department of Fish and Wildlife, *A Guide to Placing Large Wood in Streams*, May 1995 (www.odf.state.or.us/FP/RefLibrary/LargeWoodPlacemntGuide5-95.doc).

v. Stabilize bank cuts, if any, with vegetation and protect approaches and crossings with an appropriate type of rock (not river rock) when necessary to prevent erosion.

vi. Ensure that temporary road does not create a barrier to the passage of adult and juvenile fish.

vii. Vehicles and machinery must cross riparian areas and streams at right angles to the main channel wherever possible.

viii. When the project is completed, all temporary access roads must be obliterated, the soil must be stabilized, and the site must be revegetated. Temporary roads in wet or flooded areas must be abandoned and restored as necessary by the end of the in-water work period.

i. New permanent stream crossings. Build permanent stream crossings as follows.

i. Design road or trail crossings in the following priority.[11] Explain why a particular design was chosen.

(1) Nothing – road realignment to avoid crossing the stream.

(2) Bridge – new bridges must span the stream to allow for long-term dynamic channel stability, *i.e.*, no bents, piers or other support structures below bankfull elevation.

(3) Streambed simulation – bottomless arch, embedded culvert, or ford.

ii. If the crossing will occur near an active spawning area, only a full span bridge or streambed simulation may be used.

iii. Limit fill width to the minimum necessary to complete the crossing. Do not reduce existing stream width.

j. Culvert maintenance. Clean culverts by working from the top of the bank, unless other access would result in less habitat disturbance.

i. Remove only the minimum amount of wood, sediment and other natural debris necessary to maintain culvert function without disturbing spawning gravel.

ii. Place all large wood, cobbles and gravels recovered during cleaning downstream of the culvert.

iii. Do routine work in the dry, whenever feasible.

iv. Include suitable grade controls to prevent culvert failure caused by changes in stream elevation.

[11] For a discussion of crossing design types, see, National Marine Fisheries Service, Southwest Region, *Guidelines for Salmonid Passage at Stream Crossings* (September 2001) (http://swr.nmfs.noaa.gov/hcd/NMFSSCG.PDF) and Washington Department fo Fish and Wildlife, *Fish Passage Design at Road Culverts: A Design Manual for Fish Passage at Road Crossings* (March 3, 1999) (http://www.wa.gov/wdfw/hab/engineer/cm/toc.htm).

k. Streambank protection. If streambank protection is required to accomplish actions described in an approved conservation plan, the only techniques authorized by this Opinion are as follows.[12]

i. Woody plantings and variations, *e.g.*, live stakes, brush layering, facines, brush mattresses.

ii. Herbaceous cover, primarily for use on small streams or adjacent wetlands.

iii. Deformable soil reinforcement, consisting of soil layers or lifts strengthened with fabric and vegetation that are mobile at two- or five-year recurrence flows.

iv. Coir logs (long bundles of coconut fiber), straw bales and straw logs used individually or in stacks to trap sediment and provide growth medium for riparian plants.

v. Bank reshaping and slope grading, used to reduce bank slope angle without changing the location of its toe, increase roughness and cross-section, and provide more favorable planting surfaces.

vi. Floodplain roughness, *e.g.*, floodplain tree and large woody debris rows, live siltation fences, brush traverses, brush rows and live brush sills, used to reduce the likelihood of avulsion in areas where natural floodplain roughness is poorly developed or has been removed.

vii. Floodplain flow spreaders, one or more rows of trees and accumulated debris used to spread flow across the floodplain.

viii. Engineered log jams, consisting of a collection of large wood used to create structural and hydraulic complexity and redirect flow, provided that the jam is anchored primarily by the weight and shape of the structure itself. Use of cable (wire rope) or chain to anchor the jam is not authorized by this Opinion.

ix. A barb, constructed as follows, unless otherwise approved in writing by NOAA Fisheries.

(1) No part of the barb structure may exceed bank full elevation, including all rock buried in the bank key.

(2) The barb must be made primarily of stacked and anchored logs and rootwads, or incorporate large wood at one or more of the following locations.

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[12] The goal of streambank protection actions authorized by this Opinion is to avoid and minimize adverse affects to natural stream and floodplain function by limiting actions to those that are reasonably unlikely to have any long-term adverse effects on aquatic habitats. Whether these techniques will also perform adequately to meet streambank protection objectives depends on the mechanisms of streambank failure operating at site- and reach-scale. For guidance on how to evaluate streambank failure mechanisms, streambank protection measures presented here, and use of an ecological approach to management of eroding streambanks, see, *e.g.*, Washington Department of Fish and Wildlife, Washington Department of Transportation, and Washington Department of Ecology, *Integrated Streambank Protection Guidelines*, various pagination (June 2002) (http://www.wa.gov/wdfw/hab/ahg/ispgdoc.htm), and Federal Interagency Stream Restoration Working *Group, Stream Corridor Restoration: Principles, Processes, and Practices*, various pagination (October, 1998) (http://www.usda.gov/stream_restoration/).

(a) Well-embedded (*e.g.*, one-half to two-thirds of the lower part of the tree in the rock), near the tip of the barb, low in the water column for cover.

(b) Upstream or downstream of the barb, near the bank, in areas with pools greater than or equal to 3-feet deep for cover.

(3) The trench excavated for the bank key above bankfull elevation must be filled with soil and topped with native vegetation.

(4) Maximum barb length must not exceed 1/4 of the bankfull channel width.

(5) Rock must be individually placed without end dumping.

(6) If two or more barbs are built in a series, the barb farthest upstream must be placed within 150-feet or 2.5 bankfull channel widths, from the barb farthest downstream.

(7) Woody riparian planting in bank segments between barbs must be included as a project component, unless these areas already have functional riparian vegetation.

x. Whenever possible, use of large wood as an integral component of all streambank protection treatments. Avoid or minimize the use of rock, stone and similar materials.

(1) Large wood must be intact, hard, and undecayed to partly decaying with untrimmed root wads to provide functional refugia habitat for fish. Use of decayed or fragmented wood found laying on the ground or partially sunken in the ground is not acceptable.

(2) Rock may be used as ballast to anchor or stabilize large woody debris components of an approved bank treatment, but may not constrict the channel migration zone unnecessarily or impair natural stream flows into or out of secondary channels or riparian wetlands.

l. <u>Prescribed burning</u>. When prescribed burning will be used as part of a ranch conservation plan, the following conditions apply.

i. Design the prescribed burn to contribute to attainment of salmon quality criteria and indicators, and to avoid or minimize unnecessary disturbance of riparian areas.

ii. Ensure that all vehicles, including emergency equipment, are fueled, operated, maintained and stored as described above.

iii. If riparian areas are inadvertently damaged during a prescribed burn, immediately prepare a rehabilitation plan designed to attain salmon quality criteria and indicators.

m. <u>Dry cropland management</u>. Each conservation plan for dry cropland management will include the following key systems of practices, as applicable, to reduce runoff and erosion, and provide aquatic habitat functions.

i. Crop residue. Conservation tillage and residue management to leave 30% or more of the previous crop residue on the soil surface after planting, as feasible, to reduce erosion potential.

ii. Nutrient management. Nutrient management to increase the efficiency of nutrient inputs and decrease the transport of nutrients to ground and surface water. Nutrients will be applied at an agronomic rate,[13] and be setback from perennial, intermittent, and ephemeral streams as necessary to prevent degradation of surface water quality.

iii. Pest management. Pest management, including nonchemical pest control measures, designed to avoid adverse affects to surface and groundwater due to losses during transport, handling, and use, and nonpoint pollution losses after use.[14]

iv. Field and landscape buffer zones. Install and maintain field and landscape- or watershed-level buffer zones as necessary to trap or immobilize sediments, nutrients, pesticides and other pollutants before they reach surface or groundwater, and to reduce the amount and energy of runoff.[15]

n. Range and pastureland management. Each conservation plan for range and pastureland management will include the following key systems of practices, as applicable, to reduce runoff and erosion, and provide aquatic habitat functions.

i. Modify grazing practices, such season, duration, and frequency, which prevent attainment of salmon habitat quality indicators, as described above.

ii. Ensure that end of season stubble heights have a median value of four inches in uplands and six inches in riparian areas, and that livestock are removed from riparian area and pastures before "use preference" shifts to woody vegetation.

iii. Specify that all livestock handling or management facilities will have a vegetative buffer that is 300-feet wide, or wider, as necessary to prevent

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[13] 'Agronomic rate' means a quantity and timing of total nutrient application that does not exceed the requirements of the crop production and harvest or grazing system, as opposed to a nutrient application rate based on production goals that are difficult to define and variable. Calculation of the agronomic rate should take into account the total nitrogen or phosphorus resources for plant nutrition, and any retention of phosphorus in the soil and losses of nitrogen through denitrification and ammonia volatilization.

[14] Take of ESA-listed salmon and steelhead caused by any aspect of pesticide use is not included in the exemption to the ESA take prohibitions provided by this incidental take statement.

[15] Previous measures apply primarily at the field-level. This measure is aimed more at off-field use to address watershed or landscape-level concerns. Riparian forest buffers provide critical habitat functions when placed next to salmonid-bearing waters, but the full range of conservation buffer practices needs to be systematically deployed and managed across the agricultural landscape or overall aquatic habitat improvements may be small. Examples of other practices available for use at the field, watershed, or landscape-level are alley cropping, contour buffer strips, crosswind trap strips, field borders, filter strips, grassed waterways with vegetative filters, herbaceous wind barriers, vegetative barriers, and windbreak/shelterbelts.

runoff to surface waters. If a livestock handling or management facility is already in place that will not fit this buffer, the facility will be moved, whenever feasible, or the widest buffer possible will be established. When a buffer less than 300-feet wide is used, the remaining area may be averaged across the planning unit.

iv. Place new livestock water developments and, whenever feasible, move inventoried water developments, at least 0.5 miles away from riparian areas, unless livestock movement is otherwise limited by terrain or livestock are excluded from the riparian zone by a fence.

v. Ensure that each livestock water development has a float valve or similar device limiting use to demand, a return flow system, a fenced overflow area, or similar means to minimize water withdrawal and potential runoff and erosion.

vi. Ensure that no livestock are allowed to enter the specific streams reaches used by ESA-listed salmon or steelhead at any time when reproductive adults, eggs, or pre-emergent fry are expected to be present.

vii. When a livestock crossing or ford is necessary, the following conditions apply.

(1) Minimize the number of crossings.

(2) Do not place crossings in areas where ESA-listed salmon or steelhead spawn or are suspected of spawning, or within 300-feet upstream of such areas if spawning areas may be disturbed.

(3) Design and construct or improve essential crossings to handle reasonably foreseeable flood risks, including associated bedload and debris, and to prevent the diversion of streamflow out of the channel and down the trail if the crossing fails.

(4) Stabilize bank cuts, if any, with vegetation and protect approaches and crossings with clean, appropriately sized rock when necessary to prevent erosion.

(5) Ensure that livestock crossings do not create barriers to the passage of adult and juvenile fish.

(6) Design and construct stream crossings and water gaps to a width of 15-feet or less to minimize the time livestock will spend in the crossing or riparian area.

3. To implement reasonable and prudent measure #3 (monitoring and reporting); the NRCS shall ensure that:

a. <u>Project notification</u>. For each RMS plan that has ESA-listed species present in the planning unit and that will be covered by this Opinion, the NRCS will ensure that a complete, electronic notification with the following information is sent to NOAA Fisheries within five working days of approval by the designated conservationist.

i. A map or list of all stream reaches present in the planning unit that are also within the present or historic range of an ESA-listed species, designated critical habitat, or up to 0.5 miles upstream of such areas.
ii. Dates of spawning and rearing, if any, by stream.
iii. 'Problems and Opportunities' identified for ESA-listed salmon and steelhead.
iv. Habitat objectives for ESA-listed species.
v. Alternatives identified to encourage cooperative group planning
vi. A description of any alternatives proposed, but rejected
vii. A description of the Selected Alternative, its Conservation Practice components, and how those will affect the salmon habitat quality criteria.

b. Implementation Monitoring. The NRCS will complete the following actions and collect and retain the following information to assess the level of program participation and use of conservation practices as described in this Opinion.
i. After conservation practices have been installed on an individual farm or ranch, the NRCS will meet with the appropriate land manager to ensure that the practices were installed and are managed correctly, and will notify the producer in writing if any corrections or modifications are necessary.
ii. The NRCS will compile a summary of conservation practice systems installed under this Opinion throughout the Tri-County Region.
(1) Dry cropland – by type and number of conservation practices systems installed, including field and landscape buffer zones; total acres
(2) Range and pastureland – by type and number of conservation practices systems installed; including field and landscape buffer zones; total acres
(3) Streams affected – type (perennial, seasonal, ephemeral) and number; linear feet or miles; channel width
(4) Riparian buffers established – type and number; average width, acres linear feet or miles
(5) Streambank protection installed – type and number; total linear feet or miles
iii. Each year, the NRCS will complete a full plan-level and onsite review of at least 5% of the conservation plans selected at random from those developed under this Opinion to ensure that the systems of conservation systems are being designed, installed, and operated as described in this Opinion.

c. Effectiveness monitoring. Besides implementation monitoring, the NRCS will also assess habitat trends as a result of conservation actions at the stream reach level using Stream Visual Assessment Protocol indicators and, to the extent feasible, at the watershed and landscape-levels, to ensure that the plans (1) are resulting in satisfactory progress toward achieving Quality Criteria, including salmon quality criteria specifically; (2) are producing effects consistent with those predicted in this Opinion, and (3) are not giving rise to new resource concerns that adversely affect aquatic or riparian habitats.

This assessment must be quantitative, to the maximum extent feasible, based on empirical and predicted trends in salmon quality criteria indicators and any other indicators or comparisons that the NRCS deems useful for this purpose (such as a comparison of indicators for streams where a significant number of conservation systems are in place and similar streams where such systems are not in place), and may make use of reviews completed for implementation monitoring and other existing monitoring efforts

d. Annual monitoring report. By January 31 of each year, provide NOAA Fisheries, with an electronic annual monitoring report that includes a summary of the monitoring information described above, including project notifications, implementation, and effectiveness monitoring. As appropriate, the report will also include a description of any other efforts by the NRCS to carry out this Opinion and any recommendations the NRCS may have to make the program more effective.

e. Timeliness. Failure to provide timely monitoring will cause this incidental take statement to expire. If the NRCS fails to provide specified monitoring information by the required dates, NOAA Fisheries may consider that a modification of the action that causes an effect on ESA-listed salmon or steelhead not previously considered and causes the incidental take statement of the Opinion to expire.

f. Annual coordination. Meet with NOAA Fisheries by March 31 each year to discuss the annual monitoring report and any action necessary to make the program more effective.

g. Reinitiation of consultation. Reinitiate formal consultation on this Opinion within five years of the date of issuance. This term and condition is in addition to reinitiation requirements described in section 2.2 above. To reinitiate consultation, contact NOAA Fisheries at the address above.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Background

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2));

- NOAA Fisheries must provide conservation recommendations for any Federal or state action that would adversely affect EFH (§305(b)(4)(A)); Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the adverse affect of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (§305(b)(4)(B)).

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). *For* the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

EFH consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

3.2 Identification of EFH

Pursuant to the MSA the Pacific Fisheries Management Council (PFMC) has designated EFH for chinook salmon (*Oncorhynchus tshawytscha*), a Federally-managed species of Pacific salmon (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other waterbodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information.

3.3 Proposed Actions

The proposed action and action area are detailed above in section 1.3 of this document. The action area includes habitats that have been designated as EFH for various life-history stages of chinook and coho salmon.

3.4 Effects of Proposed Action

Chinook and coho salmon spawn, rear, or migrate in the Deschutes and John Day River Basins within or beside cropland, and range and pastureland managed under conservation plans addressed in this Opinion. Because of the adverse effects listed in section 2.1.3 of the ESA portion of the document, NOAA Fisheries believes that implementation of each RMS plan will adversely affect chinook and coho salmon EFH in the Deschutes and John Day River Basins.

3.5 Conclusion

NOAA Fisheries concludes that the proposed action would adversely affect designated EFH for chinook and coho salmon.

3.6 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the Magnuson-Stevens Act, NOAA Fisheries is required to provide EFH conservation recommendations for any Federal or state agency action that would adversely affect EFH. NOAA Fisheries incorporates the terms and conditions contained in the ESA portion of this consultation as the conservation recommendations.

3.7 Statutory Response Requirement

Pursuant to the MSA (§305(b)(4)(B)) and 50 CFR 600.920(j), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

The NRCS must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920(k)).

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